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The railroads, more than any other corporations, should be interested in the test plates which are to be exposed on a fence 300 ft. long at Atlantic City for the purpose of determining the best preservative compound for steel and iron surfaces. A rough estimate shows that the 400,000 steel freight cars now owned by railroads in this country have each 2,000 sq. ft. of surface exposed to corrosion, making a total of 800,000,000 sq. ft., or 18,365 acres. If to this large area is added the exposed metal in steel bridges, shops, stations and other road structures, the grand total is so enormous that its proper protection would seem to call for a special investigation by the railroads alone. The electrolytic theory of corrosion, as expounded by Dr. Cushman, attributes the solution and subsequent oxidation of iron to a transfer of electricity between the free hydrogen ions of water and the iron ions of the steel. This electrical action is very evident in those samples of steel that contain impurities having a potential different from that of the iron, and is most marked in those having an uneven distribution of such impurities. The exposed plates are therefore to be made of three grades of metal: Bessemer

low carbon steel, open hearth structural steel and pure ingot iron. They will be 24 in. wide, 3½ in. high and about ¼ in. thick. Four plates of each grade of metal will be exposed. Two of these are to be painted in the ordinary manner, after cleaning off the scale with a steel brush, and the others are to be pickled in sulphuric acid in order to completely remove the scale. A series of unpainted plates will also be exposed so that the rapidity of corrosion of the unprotected metal of different grades may be observed. Dr. Cushman's masterly research led him to investigate the possibility of protecting steel by the use of pigments and compounds which to some extent prevent electrolytic action, such as bi-chromates of the alkaline earth metals. These salts, even in small quantities, tend to cause the iron to become passive, and though for obvious reasons they are unfit for paints, they suggest the preparation of pigments from the chromates and their trial for this purpose. The experiments at Atlantic City will test the merits of this kind of protective coatings for metals. They are being made under the direction of the scientific section of the Paint Manufacturers' Association; and committees E and U of the American Society for Testing Materials will cooperate in supervising and inspecting the work.

The article on another page about the producer gas power plant of the Minneapolis & St. Louis Railroad gives some interesting facts about the first (and only) power plant of this character to be used for an American railroad shop. The primary reason for the change from steam to gas power at these shops was not an economic one, but was to relieve the residents of a nearby fashionable district of the objectionable smoke of the steam plant. A considerable gain has been realized in operating costs, however, the figures given showing the fuel cost per brake horsepower-hour to be only about one-third for the gas plant what it was for the steam plant. The tests were made by students from the mechanical engineering school of the University of Minnesota, and the figures may therefore be accepted as correct. The old plant was an uneconomical steam outfit, of course, enabling the gas plant to make the most favorable comparative showing possible. Another saving results from the reduction in labor force, two men less being needed for the producers than for the boilers. The gas plant has given a good account of itself for reliability of service in the nine months or more that it has been running. This is an important point, as uncertainty in operation is one of the objections urged against this power by steam engine advocates.

THE COAL CARRIERS' DECISION.

The United States Circuit Court of Appeals for the Eastern District of Pennsylvania in its decision in favor of the coal roads has not put the controversy finally at rest, but it has rendered a great service in drawing public attention once more to the limitations placed by the Constitution upon the power of Congress. The fathers of the Republic never acted more wisely or beneficently than when they gave to the judiciary the right to determine whether an executive or legislative act was in accordance with the Constitution.

The provision construed by this decision was that feature in the Interstate Commerce Law, as amended in 1906 (Section 1), which prohibited railroad companies from carrying in interstate commerce any article or commodity manufactured, mined or produced by them except timber, etc. The purpose of this provision was like that of all legislation against discrimination in rates—to equalize competition and to prevent discrimination by a carrier in favor of itself when carrying its own commodities to market. This purpose may be assumed to be within the constitutional powers of Congress to express in law. It was just as much within the power of Congress to provide that a railroad should not discriminate in fixing rates when transporting its own commodities as when transporting

the commodities of other parties. Congress did not exceed its constitutional right in prohibiting carriers from discriminating in their own favor.

Had Congress contented itself with enacting that no railroad should carry its own commodities except by charging itself the same rates it charged everyone else for the same service, the law would not have been obnoxious to the constitution. It would have been a law against discrimination applicable to all alike and enforceable against all alike. It would not have been either class or confiscatory legislation. But it would have been ineffective legislation. It would have prevented discrimination in rates, but it would not have accomplished equality in competition, which is the ultimate aim of all legislation against such discrimination. For while the carrier might charge the same rate to itself as to any competitor in the coal market, it could undersell its competitor in the market, to the extent of the freight-cost, which it pays with one hand and receives with the other. By this process it might lose the freight, but it would control the market and fix the price, so as to get back the freight in the profit which its monopoly would dictate. Even the Act of Congress did not prohibit in form the sale of coal by the carrier. If it had done so, it would have been plainly unconstitutional. It confined itself to prohibiting the transportation of coal mined by the carrier, which under the circumstances amounted to the same thing, as the carrier could not sell unless it could transport.

We are thus reduced to the conclusion that to prevent the carrier from itself carrying to market the coal which it owns, is in effect confiscation. And this result, as the court holds, renders the law unconstitutional certainly as to all coal property acquired prior to its enactment. This is another way of saying that while Congress may prohibit discrimination in rates, it cannot prohibit the acquisition, or transportation or disposition of property except in exercise of its police power in aid of public health, public safety, public morals, and the punishment or prevention of crime.

It was its power to regulate Interstate Commerce on which Congress relied for its warrant in enacting this legislation. But to prohibit transportation of a commodity is not so much regulation as destruction of commerce, at least in that article. Even this would be within the power of Congress could it be shown for example, to be essential to safety in traveling or to public health, or to be otherwise within that vague, undefined, but vast and powerful principle, "the police power" of the state. Whatever may be the ground upon which this legislation rested, it is clear that Congress could not by its fiat make that dangerous which was really harmless; could not declare either the mining of coal or the transporting of it to market, injurious to public morals or unsafe to public health, when in fact it is not so.

To make effective its prohibition against discrimination in rates, Congress forbade a simple, common, harmless, useful commercial act, the transportation of coal to market. And the justification was that not otherwise could equality in rate-charge be maintained, under national regulation.

The answer made by the Circuit Court is that equality in rate-charge cannot be maintained if that be the only method of doing it, for it is in violation of the Fifth Amendment to the Constitution. The taking of private property without compensation is apparently one of the most common temptations that legislatures yield to, and attempts to eat this forbidden fruit are the most frequent sins that they commit. From an early period in our constitutional history, while a number of its makers were still alive, the legislatures of the various states began their efforts to take property without compensation. Thus, in 1794 the Legislature of Vermont passed an act taking the lands in that state belonging to the Society for the Propagation of the Gospel in Foreign Parts, and presenting them to the respective towns in which such lands lay. In 1823 the propriety of this transaction was reviewed by the Supreme Court of the United States and, after hearing Mr. Hopkinson and Mr. Webster on different sides of

the question, it decided that the Vermont statute was unconstitutional.

In 1816 the legislature of New Hampshire enacted a statute changing the name and the charter of Dartmouth College. The college refused to accept the enactment and there arose one of the most celebrated controversies ever adjudicated. Mr. Webster and Mr. Hopkinson appeared for the college and Mr. Holmes and the Attorney-General in support of the state and the statute. Chief Justice Marshall in 1819 held that the college charter was a contract, that the act of New Hampshire impaired the obligation of this contract, and was confiscatory in character.

In 1887 the legislature of Minnesota established a railroad and warehouse commission with power to fix rates to the exclusion of any judicial enquiry as to the reasonableness of them. Three years afterwards the United States Supreme Court pronounced this law to be confiscatory.

In 1893 the legislature of Nebraska passed a statute whereby rates for transportation were arbitrarily fixed and common carriers were peremptorily required to comply. The Supreme Court of the United States in 1897 held this was an attempt to confiscate and adjudged the law unconstitutional.

In New York State, instances are too numerous to specify in detail where the Court of Appeals has convicted the legislature of attempts to confiscate private property. In 1878, a tax law passed in 1869 imposing an assessment upon property without notice was held to be confiscatory. Four years later the same conclusion was reached as to an act which discharged a city from liability upon its bonds under certain conditions. An act ostensibly to improve the public health by appropriating the property of private individuals received the same condemnation in 1885. Legislative attempts in the same direction were frustrated by the Court of Appeals the same year in the Butter case; in 1888, in the Prize for Purchase, and Broadway Franchise cases; in 1891, in the Involuntary Transfer case; in 1893, in the No Compensation case, and, jumping over a decade of cases, in 1905, in the Sale of Bulk Merchandise case, and last year in the Stock Transfer Tax and Real Estate Brokers Penalty cases.

What is true of New York is true of other states. Act after act of the legislatures of the different states has been declared by the courts to be null and void because of their confiscatory nature.

We may not speculate over much upon the view that the Supreme Court of the United States may take of this decision, but it seems reasonable to suppose that, in view of its uniform record in condemning unlawful appropriation of private property, whether by Congress or state legislatures, that great tribunal will approve the trenchant and vigorous pronouncement of the Circuit Court in this controversy over "the commodity clause."

What a state corporation may be authorized to do is a question for that state to determine, not the Federal Government. It may be quite unwise for a state to permit a railroad corporation to mine coal. But whether so or not, it seems quite impossible for Congress to interfere and prevent the practice, either directly by expressly prohibiting it, or indirectly by an act of the kind under view. The remedy is with the state, not with Congress.

LOCOMOTIVE GRATE AREA.

The relative advantage of large and small grates for locomotive boilers has not been definitely settled by any accurately measured tests, and there is still opportunity for the profitable investigation of this question. The Pennsylvania Railroad tests at St. Louis covered such a large field that there was not time during the exposition to deal with the effect of different grate areas in the same locomotive. Since the testing plant was moved to Altoona some experimental work has been done in this line of investigation, with one of the standard P. R. R. simple Atlantic locomotives, having cylinders 20½ in. x 26 in. and 80-in. wheels. Three series of tests were

run: (1) with full grate having an area of 55.5 sq. ft.; (2) with the front grate covered with fire brick so that the effective grate area was reduced to 39.5 sq. ft., the ratio of grate area to heating surface being 1 to 58.7; (3) with the effective grate still further reduced to 29.76 sq. ft., giving a ratio of grate area to heating surface of 1 to 77.9.

Tests of this kind have frequently been made with locomotives in service, but there was not opportunity for careful measurement of results, and whatever conclusions have been drawn have not resulted in a permanent modification of the grate area or the use of any large proportion of dead grate in general practice. The important conclusions drawn from the Altoona tests are given in the paper on "Combustion and Heat Balances in Locomotives," by Lawford H. Fry, read at the meeting of the Institution of Mechanical Engineers, London, last March. It was found that if any given quantity of coal, as, for instance, 4,000 lbs., is fired per hour, the efficiency of absorption of heat is independent of the grate area, being practically the same whether the coal is burned on the full grate of 55.5 sq. ft. at 72 lbs. per sq. ft. or on the smaller grate having an area of 29.76 sq. ft. at the rate of 134 lbs. per sq. ft. per hour.

The explanation given is that in the tests with the three different grate areas, the firebox volume is a controlling factor in combustion and is constant; so that a given quantity of coal has in all three tests practically the same opportunity of complete combustion, irrespective of the rate at which it is fired per square foot of grate.

The efficiency of the absorption of heat actually produced was found practically independent of the rates of combustion and evaporation, varying only from 78.4 to 79.7 per cent. That is, under all conditions of the Altoona tests the boiler absorbed about 79 per cent. of the heat produced by combustion, while the boilers in the St. Louis test showed a constant efficiency of absorption of about 81 per cent.

The efficiency of the boiler as a whole is mainly determined by the efficiency of combustion, which falls rapidly as the rate of combustion is increased. The rates of firing in the Altoona tests ranged from 2,000 to 5,000 lbs. of coal per hour and the chief items affected by an increase in the rate of firing are as follows: The loss of CO increased from 0.4 to 2.4 per cent. The loss of heat in the gaseous products of combustion decreased from about 18 per cent. to 15 per cent. The loss by unburned coal increased from 10 per cent. to 28 per cent. The boiler efficiency as a whole decreased from about 68 per cent. to 52 per cent. The highest rate of evaporation obtained was 18.6 lbs. of water per square foot of heating surface per hour with a boiler efficiency of about 51 per cent. At high rates of evaporation the largest grate gave the highest efficiency. This is due to the fact that the resistance to the passage of air through the grate is least with the large grate and largest with the small grate. At low rates of combustion the most important losses are those due to an excess of air; consequently, the large grate has then the lowest efficiency.

At the high rates of combustion the most important losses are those due to coal escaping unburned from a lack of sufficient air for proper combustion; hence the largest grate by admitting the air most freely gives the highest efficiency. The spark losses are less also on account of the milder blast required by the large grate.

The Altoona tests were made with a constant firebox volume and variable grate area, and it would seem desirable to supplement them with tests of fireboxes having the same length as the grate so that the ratio of grate area to firebox volume in each case would be the same, thus giving the condition of a normal boiler. This ratio is an important one and it is surprising that it has been so little used in the discussion of combustion in locomotive boilers and of boiler and firebox proportions; especially in relation to the effect of large combustion chambers.

It is important to distinguish between the efficiency of absorption of heat produced and the efficiency of combustion, the former being nearly constant, as stated above, for locomotive boilers having a wide variation in size and in the proportion of heating surface to grate area. In the St. Louis tests the ratio of heating surface to grate surface varied from 50 to 75 in four boilers whose efficiency of absorption did not vary 1 per cent. This would indicate that the arbitrary factors which have been used to determine proper grate area from its relation to heating surface are not so important, and this area should be arrived at by other considerations. The Pennsylvania locomotives have a smaller proportion of tube heating surface than is usually found in American practice, but their efficiency in absorbing heat is the same as that of boilers having larger tube surface with relation to grate area.

The efficiency of combustion, however, has an important relation to grate area and firebox volume, and it decreases rapidly as the rate of combustion increases, thus affecting the boiler efficiency as a whole. For the combustion of a given amount of coal, this rate increases as the area of the grate decreases; hence boiler efficiency is materially affected by grate proportions. In the Altoona tests, the smallest grate, one with an area of about 30 sq. ft. and burning 5,000 lbs. coal per hour, or 166 lbs. per sq. ft. grate, showed a loss from unburned coal, principally sparks, of 29 per cent. of the coal fired, with a boiler efficiency of 52.9. This large spark loss is due to the heavy blast required to burn coal at the rate given, the smokebox vacuum being about 6 in. The spark loss can be largely reduced by increasing the grate area.

In the past ten years the width of locomotive grates for bituminous coal has been increased from 40 in. to as high as 80 in. and the area from 30 sq. ft. to 62 sq. ft., and in this way the rate of combustion has been kept down to 100 lbs. per sq. ft. of grate per hour, and the spark loss to 12 to 15 per cent.

Grate area should have some relation to the quality of the coal, poor coal requiring a larger area for the production of a given amount of steam. Western coals contain a large percentage of sulphur in combination with iron as pyrites. The pyrites and ash fuse together and form a thin layer of solid clinker which effectively stops the passage of air through the grate, thereby permitting the grate bars to become overheated from the hot fuel above. The clinker then melts down into the spaces between the bars and the sulphur combines with the iron of the grate. In this way the grates are warped and destroyed in a short time. The repairs to a large grate are made at a heavy expense and the engine is kept too long out of service. Such experience, together with leaky tubes and other troubles connected with large fireboxes have, in some instances, led to the return to smaller grates. Thus in 1905 the Chicago, Milwaukee & St. Paul built a large Pacific type locomotive with cylinders 23 in. x 26 in., 72-in. wheels, a firebox 41½ in. wide, and a grate area of 35.8 sq. ft. The rate of combustion on the two-hour passenger run from Milwaukee to Chicago was 200 lbs. per sq. ft. of grate per hour. A more recent case is that of the new Pacific type locomotive built by the Baldwin Works for the Alton. The Pacific locomotives built for this road in 1904 had cylinders 22 in. x 28 in., firebox 66 in. wide and a grate area of 49.5 sq. ft. The five engines recently built have cylinders 23 in. x 28 in., 73-in. wheels and narrow fireboxes. The grate is 40¼ in. wide and 10 ft. long, and the grate area only 33 sq. ft. The rate of coal consumption required for such large cylinders will be very high, probably over 200 lbs. per sq. ft., and the spark loss will be excessive. The return to the narrow grate is therefore at the expense of coal economy, but is necessary in order to avoid the troubles from pyrites in coal and from leaky tubes attending the use of the large grate. Where the coal permits of the large grate being maintained at ordinary expense it is the most economical and should be of such an area that the rate of combustion shall seldom exceed 100 lbs. per sq. ft. per hour.

THE MISSOURI RIVER JOBBERS' CASE.

The railroads having lines from the Mississippi to the Missouri river crossings have determined to ask the federal court for an order forbidding the enforcement of the decision of the Interstate Commerce Commission in the Missouri river jobbers' case (*Burnham, Hanna, Munger et al. v. C., R. I. & P.; I. C. C. No. 983, June 24, 1908*). The Commission's action in this case, if not appealed, or if upheld by the courts, will directly, and also probably indirectly, as a precedent, influence freight rates in a large territory. It will disturb rate relations that have existed for many years and that have become so well settled as to be justly regarded as satisfactory to all parties. The Commission offers little argument in justification of this disturbing decision.

The jobbers at Kansas City, St. Joseph and Omaha complained to the Commission that class rates from Atlantic seaboard territory to the Missouri river were unreasonable and also were unduly discriminatory as compared with the rates from the same territory to Minneapolis and St. Paul. The testimony in the case showed, and the Commission held, that the rates of the all-rail American lines to the Twin Cities are controlled by water competition and by the competition of the Minneapolis, St. Paul & Sault Ste. Marie in Canada, and may, therefore, reasonably be lower than the rates to the Missouri river cities, although the distances are practically the same. But the Commission held that the through rates from the seaboard to the Missouri river cities were too high, because those portions of the through rates applied between the Mississippi river crossings and the Missouri river cities (60 cents, first class) were too high, and ordered those portions of the through rates reduced to the basis of 51 cents, first class. The Commission's order had no direct bearing on the controversy between the Missouri river points and the Twin Cities; that controversy it decided flatly against the Missouri river points. The Commission made no attempt to demonstrate that the Mississippi river-Missouri river rates were unreasonable *per se*; in fact, it indicated (page 312 of the opinion) that they ought not to be reduced locally. The condemnation of the use of the rates from the Mississippi river crossings to the Missouri river as portions of the through rate from the seaboard is based on the bald declaration that they are too high. The decision is in effect a condemnation of the basing point principle as applied in this case; and if taken as a precedent would have far-reaching results. The Commission specifically states that it does not favor the abolition of basing points for rates; but, unfortunately, matters of this kind are settled more by acts than by mere dicta.

There has been a good deal of academic discussion of whether the through-rate principle or the basing-point principle works out the more equitably and expediently in practice. The development of the basing-point system in the west has not been the result of academic discussion, but the outgrowth of physical and commercial conditions. The extreme western termini of the eastern roads were originally at East St. Louis. In time roads were built from the east to other points on the Mississippi, and other roads were built westward from the Mississippi to the Missouri, and still others were built westward from the Missouri. The conditions east and west of the rivers were different. It was natural in these circumstances that the rates on merchandise from the Atlantic seaboard and on grain and other commodities moving eastward should be made to break on the two rivers. The practice of applying combination rates on through business which thus early grew up has been continued up to the present time.

Have the results of the use of the basing-point system in this territory been salutary or otherwise? Under it the jobbers at St. Louis, Hannibal, Quincy, Keokuk, Burlington, Davenport and Dubuque, on the Mississippi river, and the jobbers at Kansas City, St. Joseph and Omaha, on the Missouri river, have competed for business in a larger territory beyond

the Missouri river on terms which they, the merchants, concede constitute an exact parity as between themselves and the eastern jobber, and also exact parity with each other. The eastern jobber could not ship goods direct to the retail dealer west of the Missouri river any cheaper than the jobber in any of the cities mentioned could buy and reship them. All paid 87 cents from the seaboard to the Mississippi river, 60 cents from there to the Missouri river, or a through rate of \$1.47 to the Missouri, and the local rates beyond. Chicago and other cities intermediate between the seaboard and the Mississippi river have been at a relative disadvantage because the rates do not break on these intermediate cities. The Chicago jobber, for example, has to pay a rate of 75 cents from New York to Chicago and 80 cents to reship to the Missouri river, a total from the seaboard to the Missouri river of \$1.55. With rates on the bases indicated the jobbing points both on the Mississippi and Missouri have prospered greatly, as has the country surrounding them. The jobber at Chicago and other points in central territory, and the jobber in eastern territory, have also been able to compete to some extent in trans-Missouri territory. Each jobbing center has had an advantage in some part of the territory, while all have been enabled to compete throughout a very large area, which has proved a salutary condition of affairs for carriers, jobbers, retailers and the public. The basing-point system seems amply to have justified itself in this territory.

What will be the resulting condition of affairs if the adjustment made by the Commission shall stand? Jobbers at the Atlantic seaboard and at Kansas City, St. Joseph and Omaha will be able to ship to the Missouri river on a through rate of \$1.38 (first class)—87 cents to the Mississippi river, plus 51 cents to the Missouri. The jobber at St. Louis and other Mississippi river crossings will have to pay \$1.47, or 9 cents per 100 lbs. more—87 cents to the Mississippi and 60 cents to the Missouri. The jobber at Chicago will have to continue to pay 75 cents from the seaboard to Chicago and 80 cents to the Missouri river, or \$1.55; his disadvantage as compared with the Atlantic seaboard and Missouri river jobbers being increased from 8 cents, under the old arrangement, to 17 cents on the new basis. To the jobbers at other intermediate points—including Pittsburgh, Cincinnati, Buffalo, Detroit and Indianapolis—the effect will be like that at Chicago. On the new basis the jobbers at the Missouri river will be better able than heretofore to compete with the jobbers of these intermediate cities and with the jobbers at Mississippi river crossings for business in Iowa and Missouri; but the chief effects will be felt in the territory west of the Missouri, where competition seems likely to be greatly restricted.

The question will, of course, be asked if it is desirable to abolish the Mississippi river as a basing point, why is it not desirable to take the same action with reference to the Missouri river? If the jobbers at Kansas City, St. Joseph and Omaha are to have the advantage of through rates from the Atlantic seaboard, those at Salina and Wichita, Kan., Beatrice, Neb., and a number of other points beyond the Missouri river that compete with Missouri river points will demand the same advantage. Why should not the wholesaler at Chicago or St. Louis enjoy the advantage of through rates on all commodities to all points in trans-Missouri territory?

It is by no means certain, however, that the adjustment made by the Commission in this case will stand, even if sustained by the courts. The jobbers at Mississippi river crossings in Iowa and Missouri may appeal to their state railroad commissions to put them once more on an equality with the jobbers on the Atlantic seaboard and the Missouri river. The Missouri and Iowa commissions can at once do this, so far as regards a large part of the traffic, by reducing the interstate rates between the Mississippi and the Missouri rivers from the basis of 60 cents, first class, to the basis of 51 cents. The Commission clearly foresaw the bad effects of a reduction in the local class rates, but it apparently ignored the likelihood that the

reduction which it ordered might provoke the very reduction that it deprecated. It might be asserted that all these resulting disturbances, howsoever costly they may be to railroads and jobbers, are justified by some glaring injustice in the river-to-river rates which cries out for correction. But we find nothing in the report of the decision to justify admitting this, even for the sake of argument.

CENTRAL OF GEORGIA.

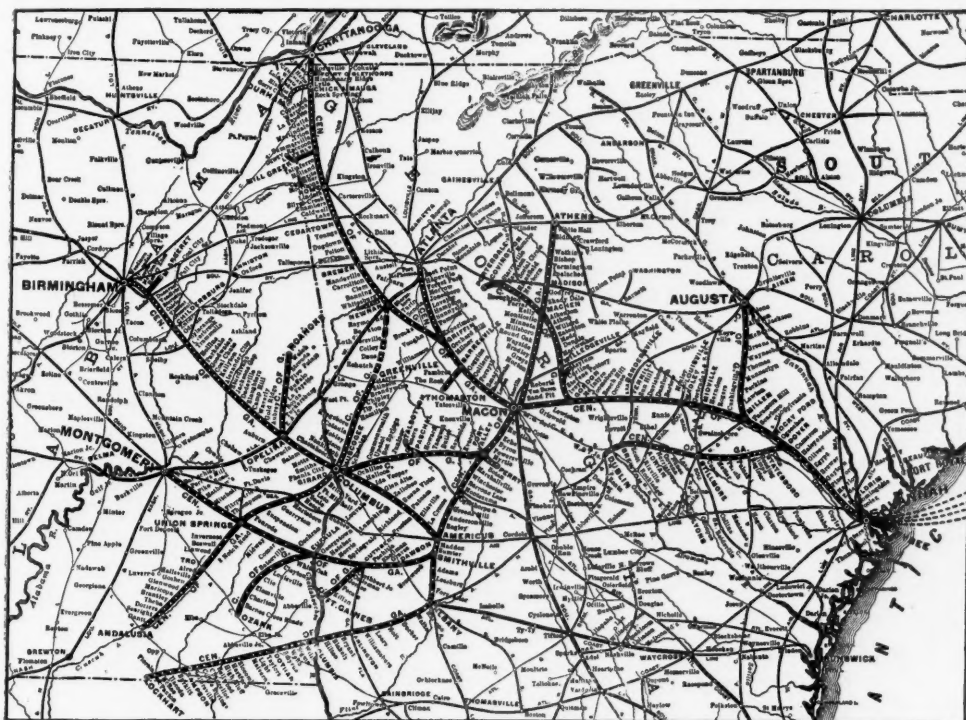
The light thrown on the situation of the income bondholders is the most interesting feature of the annual report of the Central of Georgia. There are \$15,000,000 income bonds outstanding and in 1907 there was paid on them \$461,000 in interest. After this interest payment, there was left a surplus of \$32 to be transferred to profit and loss account. The income bonds, divided into first, second and third preference, are entitled to 5 per cent. interest "when earned." During 1908 no interest was paid on these bonds, and the road found itself with a deficit of \$3,500. The Central of Georgia owns the entire capital stock of the Ocean Steamship Company, of

influence on the relations of the two roads in the future, as the Central of Georgia now has and the Illinois Central soon will have lines into Birmingham, Ala.

The gross earnings for 1908 were \$11,700,000, a decrease of about \$400,000 from the previous year. In company with most of the other roads in the country an attempt was made to reduce expenses, and in the case of the Central of Georgia, operating expenses, including taxes, were reduced a little over 5 per cent., being \$9,000,000 in 1908. The reduction appears to have been fairly apportioned among the different departments—conducting transportation, maintenance of way, and maintenance of equipment. Net earnings which were \$2,600,000 in 1908, an increase of over 4 per cent. over the previous year, went toward paying interest charges and rentals, which increased from \$2,300,000 in 1907 to \$2,800,000 in 1908. If the accounts were stated on the same basis in 1908 as in 1907, the increase of \$100,000 in net would become a decrease of \$200,000. In 1908 there is an item of over \$300,000 for betterments, while in 1907 certain betterments were charged to operating expenses.

There were sold during the year consolidated mortgage 5 per cent. bonds to the amount of \$1,000,000, and from the proceeds there was spent \$600,000 for betterments. Of this \$470,000 was spent on new shops, machinery and tools at Macon.

In spite of the decrease in gross earnings the expenditures for maintenance of way and equipment were liberal. The company had 24 more locomotives in service than it had a year ago and spent on an average \$2,101 per locomotive for repairs on the 316 locomotives in service at the end of the year. This is about \$300 less than was spent in the previous year, but renewals are not included in the 1908 figures, and presumably were included in the figures for the previous year. Repairs of passenger cars cost \$673 per passenger car in 1908, as against \$914 spent in 1907, and repairs of freight cars cost \$68 per car last year, as compared with \$102 in the previous year; but what was said in regard to renewals of



Central of Georgia.

Savannah, but in the railroad company's report the only mention of the operation of the steamship company is a short statement by President J. F. Hanson to the effect that owing to depressed business conditions, the income of the steamship company was less than in the previous year, and that the new steamship, "City of Savannah," had been put in operation. No dividends were declared. It is the contention of the income bondholders that they are entitled to an equity in the earnings of the steamship company, and there is a suit now pending, brought to compel the declaration of dividends by the steamship company. The attitude taken by the railroad company is that the equity in the steamship company's earnings belongs rather to the railroad company's stockholders than to the income bondholders.

It will be recalled that the \$5,000,000 capital stock of the Central of Georgia was sold by the Southern Railway to Oakleigh Thorne and Marsden J. Perry, who were acting in the interests of E. H. Harriman, and that during the past year Mr. Harriman stated that he had bought the stock in the interest of the Illinois Central. This event is in no way reflected in the annual report but it may have a decided

influence on the relations of the two roads in the future, as the Central of Georgia now has and the Illinois Central soon will have lines into Birmingham, Ala.

That the Central of Georgia needs new capital to spend on improvement of its line is shown by the fact that it still has 466 miles of main track laid with 56-lb. rail. Mr. Hanson says: "The small balance carried forward from the sale of the 5 per cent. consolidated bonds, and the \$300,000 of these bonds remaining in the treasury constitute the only capital reserve to cover cost of additions and betterments for the future. Unless other capital is provided, additions and betterments in the future will be restricted to expenditures that may be properly charged against income."

Here again the position of the income bondholders is of interest because no new debt can be created senior to the income bonds without the consent of the holders of these bonds.

Traffic returns show a decrease in all classes of freight carried, with the exception of products of mines and products of agriculture, and the tonnage of these two classes increased but slightly. The proportion of the different classes of freight carried remains about the same as in the previous year, products of forests however being only 19 per cent. of the

total tonnage in 1908, as compared with 25 per cent. in the previous year. The bituminous coal tonnage has increased in eight years from 251,508 tons to 930,231 tons; the increase last year was 75,928 tons.

The impression gained from a study of the annual report is that the road is suffering, like its neighbors, from business depression and from the high cost of labor, materials and supplies. Its difficulty will be to raise new capital for needed betterments and improvements. If there is any decided improvement in business conditions with corresponding increase in traffic, the Central of Georgia will be in need of considerable sums to be spent on improvements if it is to handle the increased traffic to the best advantage. The following are the principal statistics of the year's operation:

	1908.	1907.
Total miles operated	1,913	1,913
Passenger earnings	\$2,953,115	\$2,944,895
Freight earnings	7,609,249	8,173,630
Gross earnings	11,658,652	12,082,777
Maint. way and structures	1,456,695	1,579,010
Maint. of equipment	2,091,117	2,249,318
Conducting transportation	4,575,923	4,887,176
General expenses and taxes	945,384	890,712
Total op. expenses and taxes	9,069,119	9,606,216
*Betterments	324,768	
Net income	2,264,764	2,476,561
Other income	236,103	311,938
Total income	2,500,867	2,788,499
Interest and rentals	2,831,062	2,340,374
Balance	†330,195	448,125

*Included in operating expenses in 1907.
†Deficit.

Letters to the Editor.

SUPERHEATER ON ENGLISH LOCOMOTIVES.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

On page 528 of your issue of July 17, in an article on the "British Locomotive," Mr. A. W. S. Graeme mentions that "Superheating is being tried on one or two lines (in England). In each case the waste heat in the smokebox is used to superheat the steam on its way to the cylinders." This statement is not correct since already a number of English railroads, viz., the Lancashire & Yorkshire Ry., London, Brighton & South Coast Ry., Great Northern Ry., Great Central Ry., are applying my smoke tube type of superheater, in which not the waste heat but the live heat of the gases is used to highly superheat the steam.

Thus in spite of the conservatism of English locomotive engineers in general, the application of highly superheated steam on locomotives makes there good headway.

Cassel-Wilhelmshohe, Germany.

WILHELM SCHMIDT,

STEEL TIES ON THE MEXICAN RAILWAY.

Mexico, September 7, 1908.

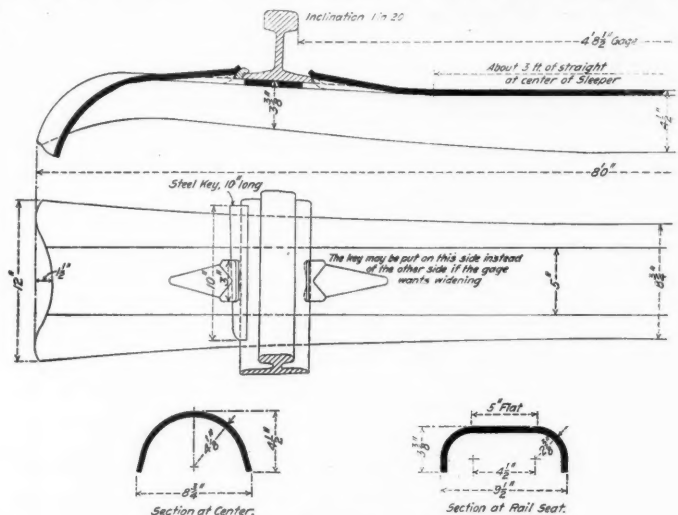
TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

The steel ties which we are using are stamped from steel plates $8\frac{1}{2}$ ft. in length by 14 in. in breadth and $\frac{7}{16}$ in. in thickness. The length is reduced, by bending ends downwards, to 8 ft., width at ends 12 in. and in center about 8 in. The weight is about 110 lbs., while the weight of fastenings, which are steel wedges, 10 to 11 in. in length, is $1\frac{1}{4}$ lbs., each, or $2\frac{1}{2}$ lbs. per tie. The cost of these wedges is about 3 cents, each, or 6 cents per tie. They are split in the center for 3 or 4 in. from the smaller end and one fork bent under the rail to prevent the wedge from working out, an arrangement which is satisfactory. This form of tie costs us, delivered at Vera Cruz, \$2 gold, each.

As to durability, they will last as long as they are protected by a coating of tar, pitch, asphalt or paint. Those on this railroad are given a hot bath of tar while new and the tar remains for 15 years or more, depending upon climate, presence of salt air, alkalis or acids in ashes, etc. The first steel ties used on the Mexican Railway were laid in 1884, and 90 per cent. of these are still in first class condition. Some of them have been broken at the joints on account of very weak straps formerly used. The tie is very simple in

construction, the lug fastenings being punched from top table of tie at the same time the ties are shaped in a form, all one operation. These ties are spaced the same distance apart as wooden ties for similar service.

One of the most important points about steel ties is that broken rock, slag or any of the other coarse ballast cannot be used with success. A good clean gravel or even a very coarse sand is the best thing. Any of the finer kinds of ballast will do, which will pack well under the ties. With broken rock, slag and other such ballast steel ties would probably be a failure. There is no doubt about their being a suc-



Steel Ties Used on Mexican Railway.

cess if properly shaped and with good fastenings and the proper kind of ballast. These ties should undoubtedly last 30 years or more. We have little trouble from corrosion except in the immediate vicinity of the Gulf of Mexico.

*I send you a blue-print, showing the steel tie and fastening as at present used on this railroad.

The few breakages which we have encountered occurred at the rail seat and were probably due to the light rail and wide spacing of ties, viz.: 12 to 13 per 30-ft. rail, which was the practice when this line was first laid. We are having no trouble by breakages with our latest tie and the closer spacing.

W. MORCOM,

Oficina del Administrador-General, Compañía del Ferrocarril Mexicano.

FREIGHT CAR RECORDS AT NEW CASTLE.

Pittsburgh, Pa., Sept. 9, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

In your issue of August 7, page 658, under the heading, "Joint Interchange and Inspection Bureaus," you say that "At only one city in the country—Denver—is a joint bureau maintained for gathering data for the operating departments regarding interchanged cars." There is another city, New Castle, Pa., at which the Pennsylvania Company, the Baltimore & Ohio and the Pittsburgh & Lake Erie, have a clearing house or bureau. That bureau handles not only all cars interchanged under the per diem rules and regulations, making the necessary records, but it also handles all cars delivered by said railroads to the large industries and to consignees who receive their freights on public delivery tracks. The bureau has been in operation since December, 1906, and very seldom is there a discrepancy. During the last 12 months the discrepancies have not been one-tenth of 1 per cent. New Castle is not a very large city, but there are some very large plants located there, the various plants of the United States Steel Corporation handling, in good business seasons, approximately 14,000 cars a month.

*W. M. PRALL,

Commissioner, Pittsburgh Car Demurrage Bureau.

*Some facts concerning the design of this tie by Mr. Livesey, and its introduction in India and Mexico by Sir A. M. Rendel, were published in this paper August 14, page 699.

CAST IRON CAR WHEELS.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

In a few weeks or months our 50-ton capacity freight cars will again be busy rolling over the country at 25, 40 and even 50 miles an hour, and the low records of broken wheels of the past summer will give place to the old and familiar reports of costly wrecks from cast iron wheels under heavy loads. This being so I offer no apology for again bringing up this troublesome question. Many of the cars now in service or soon to go into service are those which were built in the strenuous times of 1906 and 1907 when by stress of competition wheels were accepted which just barely answered the specifications.

In all the talk and in all the writings on the wheel question, approval or condemnation has been based on the average wheel or the average mileage. This will never bring us out of the woods. All interested, the manager, the purchasing and the mechanical departments should care nothing about the average result, but should demand the purchase of only such wheels as will be equal to those already received for similar service which have given the maximum result as to wear and strength. This is only what is required and expected of the purchasing agent of any well established manufacturing concern. He is held to a great extent responsible for results obtained from what he buys. The management never listens to the average result, but demands one quality, and that on a standard up to the best machine or tool of its kind and for similar service. They get it too! Put it up to the purchasing agent of the railroad for results and he will stand by the wheel company that can furnish his road wheels 95 per cent. to 100 per cent. of which will give the best result that can be obtained from the metals and shop practice at any given time. This will mean, at least for the immediate future, some special inspection, to be reported directly to the purchasing agent.

At the present time those interested in the manufacture and use of the cast iron wheel may be divided into four classes: (1) Those who are satisfied, (2) those who are indifferent, (3) those who believe that the best wheel amply strong for all requirements can be made without charcoal iron as a base in the mixture, and (4) those who believe the cast iron wheel will be made nearly perfect principally by the use of not less than 40 per cent. charcoal iron. Speaking generally neither the wheel makers nor railroad officers are talking for publication.

A few railroad officers are making strenuous efforts to get down to the bottom of the question. The position of the wheel makers appears to be in line with the expression of one of them who says:

... In such a case, as in too many others that have prevailed, "the manufacturer of chilled car-wheels with the easiest conscience would probably get the larger part of the orders. ... To incorporate a manufacturer's responsibility is an indefinite matter. This should come under the head of proper inspection on the part of the purchasers. ... Increased coning may give advantages in some respects. ... This, however, is a matter for the railroad to work out. ... And again, in regard to throat radius: This is a matter that concerns the railroad companies. ..."

Here is an admission which suggests that something definite would be gained by changing the method of inspection so as to include the making of the wheels as well as the finished product.

The car wheel makers, for some good reason, seem to favor working under specifications calling for 40 per cent. charcoal iron, although it has been conclusively shown that there is not sufficient charcoal iron produced in this country for the car wheels needed.

We have heard a great deal lately about "good" material, "bad" material and "live" material. Investigation has developed that under given foundry conditions causing bad foundry practice, just as weak and "rotten" cast iron wheels were made from the J. N. Barr 40 per cent. charcoal, 60 per

cent. old wheels, mixture as were ever made under the same shop conditions from the cheapest mixture obtainable! Further investigation has brought forth the fact that the melting conditions and foundry practice have more to do with the quality of the wheels produced than has the percentage of charcoal iron in the mixture.

As a matter of scientific fact can there be such a thing as "live" iron or "dead" iron, "good" iron or "bad" iron? The foundrymen were a long time getting over making mixtures by "fracture" grading, and too many of them haven't got away from it to this day. Given a certain casting produced under certain heat treatment conditions and of known chemical composition, does it make any difference in the chill, hardness or strength of such a casting, what name or brand of iron is made from it—whether charcoal, coke iron or scrap iron—so long as the weight (actual) known chemical composition and heat treatment conditions remain the same? A few have already answered this question in the negative.

What has the railroad, the wheel maker or the public to depend on, if some of the proposed plans for improvement are not adequate? Mr. J. E. Muhlfeld, of the Baltimore & Ohio, says (*Railroad Age Gazette*, June 12): "Although the wheels under tenders are subjected to especially severe tread service, * * * it is not exceptional for them to run from 80,000 to 100,000 miles before removal for either worn, shelled or brake-burned treads."

The answer to the above question is to get wheels 100 per cent. of which will be as good as those referred to by Mr. Muhlfeld. Such wheels may be had by throwing the design of the wheel upon the mechanical department, and the responsibility for results on the purchasing department; and by changing the specifications so as to make them include inspection of the wheels as they are being cast (and also when they are ready for shipment, as at present).

Design and Inspection.—It is not difficult to learn what special features of the various designs so far tried in a given service have given the best result. Those who know and are unbiased affirm that the increased coning of the tread has safeguarded the flange without detriment to any part of the wheel. If this is a fact the change in design should be adopted at once.

Putting the responsibility on the purchasing agent would change the methods of that department materially. We are told of cases where the salesman of an almost idle shop, anxious to have only his fixed charges taken care of, has, by being willing to cut the price and to guarantee anything, secured an order at cost; and this price has been used against all other wheel concerns furnishing wheels to that railroad. It is true that the purchasing agent was depending upon the specifications to safeguard his cars, but the fellow who has taken the order at cost commences to find ways by which his shop may at least make a few cents per wheel, and he requires sharp watching. But with added responsibility as to the results the purchasing agent will hesitate to weigh a saving of 25 cents a wheel on a few thousand wheels against the possibility of a \$20,000 wreck on his road.

Results prove that one, two or three wheels out of 100 or 103 wheels, even from the same day's cast, do not actually indicate the quality of the remaining wheels in the lot. The remedy is in having the inspection carried on while the wheels are being produced. It should be no difficult matter to learn what is the right thing as to—

Charging of the metals.

Melting of the iron.

Temperature and speed of pouring.

Shaking the wheels out of the flask.

Temperature to go into the pits.

Condition of the pits, and

Length of time for pitting and taking out of pits.

Significant Facts.—A shrewd and conscientious wheel inspector was offered several hundred wheels at one time and according to custom he took out all the tests for the whole lot, so the same could be prepared for final test while he was

going over the balance for surface inspection and taking numbers. The test wheels should indicate the quality of the poorest wheels in the lot. During the preparing of the test wheels for testing, and remembering peculiar practices on earlier lots of wheels, the inspector became suspicious whether the wheels in the sand for the thermal test were the same wheels which he had picked out. In a courteous manner and without indicating his suspicions he asked that these wheels be lifted so that he could check up the numbers before going on with the test, but was flatly refused opportunity to determine whether he was being treated squarely or not. In this instance the inspector refused to go on with the work of inspection, and left the shop.

A prominent inspector of a large railroad was convinced that the test drop machine at a certain plant was not made according to specification; but he was forbidden to interfere because the road had lately sent another inspector to inspect the drop machines in all the plants furnishing wheels to it.

Wheel makers' employees study the eccentricities of the different inspectors. If the inspector is in the habit of taking the first, the third or the fourth wheel in the row, or if he goes to the middle of the row for his test wheels, the choicest wheels in the lot are placed accordingly. Where it is customary for the inspector to take three test wheels out of each hundred numbers, employees do their best to "steer" the inspector against numbers that will match up; and of course from only first class wheels.

Suggestions.—It would be well for the railroads to have an "inspection clearing house" on the wheel question, where all rejected wheel numbers could be turned in. The numbers, showing the wheel maker's name, should be furnished to all roads, and also to the repair shops; and wherever a wheel is found that has been once rejected, it should be removed from service. This would prevent private car lines from buying rejected wheels. We shall eventually come to inspection during the process of manufacture. This inspection must be done by men who thoroughly understand the necessary operations to produce good wheels from the raw material. Inspection of finished product only is too late. Too many officials consider the inspection that rejects the only kind that is necessary to pay for. Many inspectors work on the idea that unless they show rejections on their reports there will be the belief in the mind of the higher official that the inspector is negligent or incompetent. The time is at hand for plain speaking.

H. G. I.

THE NEBRASKA RAILWAY EMPLOYEES' ASSOCIATION.

Omaha, Neb., September 8, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

The Nebraska State Railway Employees' Protective Association has been in existence only a few months, but it is to-day a factor in the politics of the state. We demonstrated our strength at the recent primary election by nominating 75 per cent. of the candidates for the state senate and house of representatives and our man for governor. The Association's method of proceeding is as follows:

An executive committee has been formed, composed of two employees of each railroad in the state. The members of this committee went to each division point, taking a few enthusiastic members of the association with them, and arranged for a meeting in the town, all the railroad employees possible being induced to attend. Addresses were made, showing the need for railroad employees to organize for their own protection, and all railroad employees present were invited to become members. An admission fee of 50 cents was asked of each man earning over \$60 a month, and one of 25 cents of each man earning less than this amount. All members have an equal voice in the meetings.

In this way the whole state was covered and 14,000 members are now enrolled. The executive committee gets the

names of the candidates favorable to the interests of railroad employees from the local organization at the division point after the subject of the way railroads ought to be treated has been gone over carefully with the candidates. We do not care to what party a man belongs so long as his attitude is not unfavorable to what we regard as our interests and rights. One of the best results of the formation of this organization has been the awakening in railroad employees of an interest in the enormous outlays by the railroads, their employers. They are beginning to realize that the success and welfare of employees and employers are to a great extent identical and men who have neglected to vote for 10 years, and even longer, are now more anxious to vote than those who have been voting regularly.

The organization is also having a tendency to draw the union and non-union employees closer together. That bitterness which in the past hampered the company and spoiled the men fast disappears when you get them enrolled in one association having for its object only their ultimate good. We find non-union and union employees who before this were not even on speaking terms now attending the same meetings, talking over the same subjects and putting their shoulders to the wheel to help everything along.

We hold meetings at least once a month; we have had one meeting in the Union Pacific shops at Omaha at which addresses were delivered to 2,000 men, about one-half of whom are now members of the association. The movement has appealed to the good sense and intelligent self-interest of the employees, and I look to see it become nation-wide before the end of the present year.

H. W. E. M'DANIEL,

Chief Clerk, General Foreman's Office, Union Pacific Railroad.

BALTIMORE & OHIO STATION AT WHEELING.

The new Baltimore & Ohio passenger station at Wheeling, W. Va., was opened to the public on September 2. The station is one of the most complete and handsome on the Baltimore & Ohio. Its construction and other terminal improvements at Wheeling cost about \$2,000,000. All arrangements for this improvement were made and the work well advanced before the business depression started last fall, so that its completion has no particular significance as regards industrial and financial conditions.

The new station is 250 ft. long, 90 ft. wide and three stories high, and is of fireproof construction throughout. The exterior walls are of brick faced with pink granite and Bedford, Ind., limestone to second floor level, above which they are faced with Howard brick and trimmed with limestone and terra cotta. All interior partitions are of hollow tile; floor and roof constructions are of steel and concrete and the roof is covered with green glazed tile and sheet copper. There is a power plant, across the street from the station, to heat the building, furnish electricity to operate the various elevators, and to light the station building and adjacent concourse, umbrella sheds, tracks and freight yards.

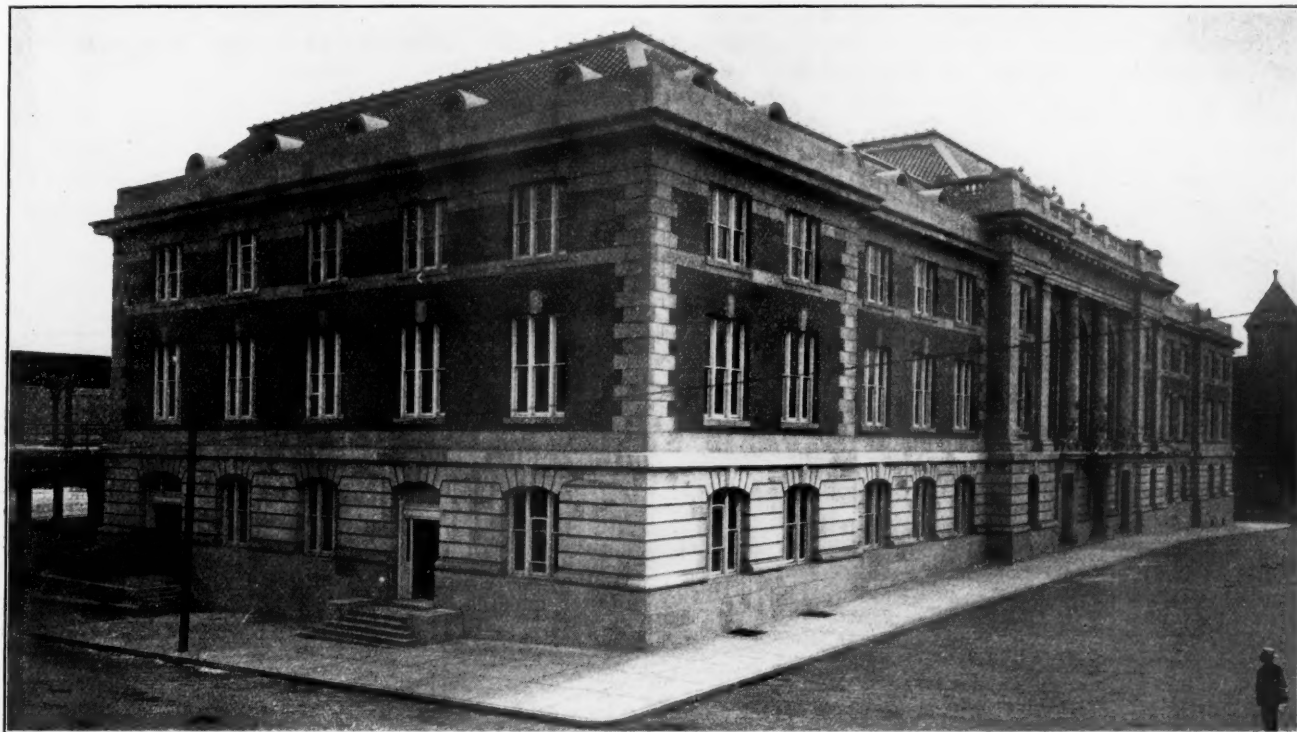
The building is between Chapline and Market streets, and fronts to the north on a plaza, which land is owned by the railroad. The railroad tracks pass the station to the south on an elevated steel viaduct at second floor level. Passengers reach the track level by two flights of reinforced concrete stairs leading up between the tracks to the two steel umbrella sheds, thus avoiding the crossing of tracks at any time. This steel viaduct, which was built in connection with the station, is 86 ft. wide and 935 ft. long, carrying four rock ballasted tracks and two concrete platforms with umbrella sheds. It crosses the streets at either side of the station, and also Wheeling creek. It has a reinforced concrete floor, waterproofed and drained.

The entrance to the station from the plaza is directly into the general waiting room, which is 55 ft. wide, 90 ft. long and 30 ft. high. About the walls of this room are massive

Tuscan pilasters carrying the heavy beams of the ceiling. The room is wainscoted throughout with verd antique marble, and the floor is laid with white marble tile with dark red borders. Three large glass ceiling lights light the middle of the room from skylights in the roof. The electric lights are on 12 bronze pilaster brackets, carrying three large opal globes each, and 15 large bowl fixtures on the ceiling, one

to the baggage and parcel rooms, and to the right to the express company's rooms and offices—these two departments being located in the extreme ends of the building. Electric freight elevators are provided for both baggage and express.

Opening directly into the general waiting room on the right are the men's and women's waiting rooms, separated by the corridor, the women's room fronting on the plaza and the



Passenger Station at Wheeling, West Virginia; Baltimore & Ohio.

being in the center of each ceiling panel. The walls of this room are painted a rich scarlet lake, toned slightly toward terra cotta red, with all window and door trim, pilasters, beams, etc., an old ivory white, and the ceiling a light buff. The bases of pilasters are bronze and caps gilded. The orna-

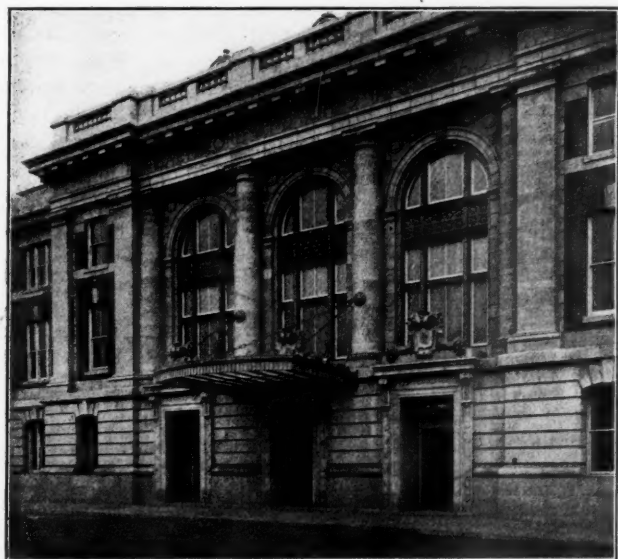
men's room on the track side. These rooms, as well as the corridors on the first story, are floored and finished to correspond to the finish of the general waiting room. All toilets are wainscoted with white marble and have floors of terrazzo. The ticket and telegraph offices, news stand and information bureau are located on either side of the general waiting room near the doors leading to the tracks.

All office floors throughout the building are laid with edge grain yellow pine and all wood trim in quarter sawn white oak. All office walls are tinted light buff with ceilings about two shades lighter. Oak woodwork throughout the building is stained dark Flemish brown and finished a dull wax finish. Two electric passenger elevators serve the office floors. Grass plots are laid out both north and south of the station, and shrubs and flowers will be planted as soon as conditions permit.

The layout of the station and other improvements was planned and carried out under the general direction of D. D. Carothers, Chief Engineer, while the architect of the whole work was M. A. Long, the company's architect, who had direct supervision of it. The bridge work of the steel viaduct, etc., has been done under the direction of W. S. Bouton, Engineer of Bridges.

RAILWAY SIGNAL ASSOCIATION.

The regular September meeting of the Railway Signal Association was held at the Great Northern Hotel, Chicago, on Tuesday the 8th. About 50 members were present. Mr. L. R. Clausen presided. The first business to come before the meeting was a paper on Snow Melting by J. S. Lang, Superintendent of the Power Plant, at the Boston South Terminal. Mr. Lang was unable to be present and the paper was read by Secretary Rosenberg. The paper was printed in our last



Main Passenger Entrance.

mentation on the ceiling beams, etc., is picked out in gold, scarlet and blue, the colors harmonizing with the colors of the glass ceiling lights. The finish on all electric fixtures is dull old brass, to match the hardware throughout the building.

From the general waiting room a corridor leads to the left

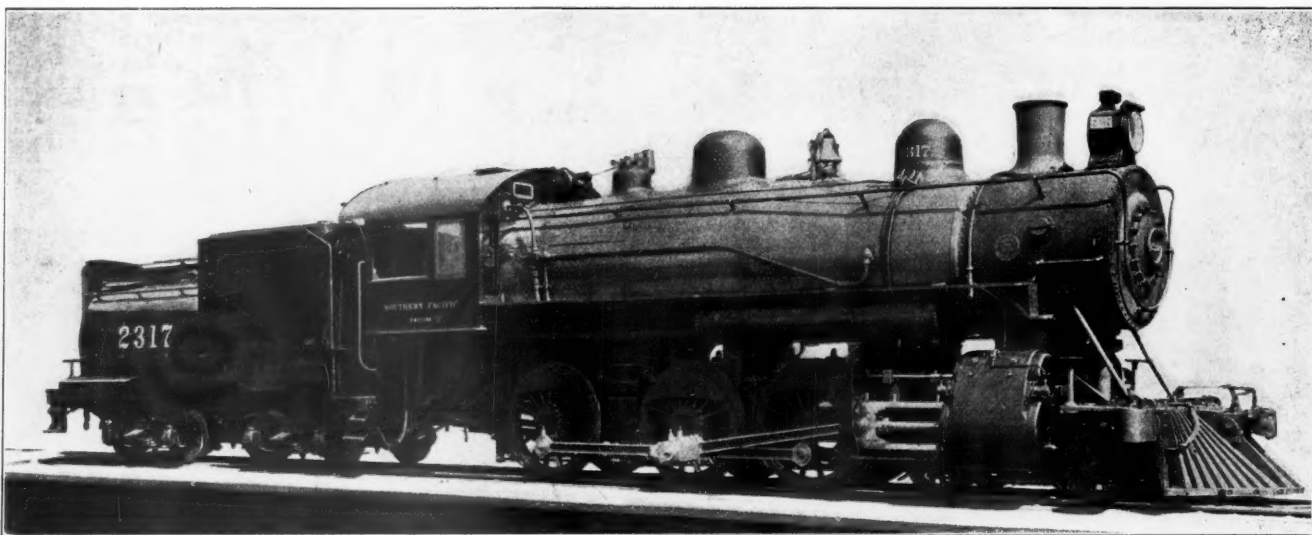
issue. After it was read there was a brief discussion, led by Mr. Rosenberg, who had seen the system in operation at Boston. The system is the result of several years' experimenting at the Boston Terminal, where it is now used to the exclusion of all other arrangements. Throughout last winter there were no delays caused by snow and no extra men were required to clean switches. The hydrocarbon used is one of the by-products of the manufacture of Pintsch gas. It can be applied either from hand cans, on which there is a patent, or as described in the paper. The heat developed is just sufficient to melt the snow and will not injure insulated wires in trunking, or the gaskets of pneumatic apparatus. The system was tried last winter in the Grand Central Station yard, New York, and showed very favorable results.

The members next discussed a report of a Sub-Committee of Committee No. 1. on Standards. This report has been

in the opinion of the committee it is safer and more economical in the end to use galvanized pipe. Mr. Mock said that 50 per cent. of the plants examined by the committee showed defective painting and poor maintenance. Galvanized pipe costs approximately 1.65 cents per foot more than ordinary pipe. The other items in the report received but very brief discussion.

TEN-WHEEL LOCOMOTIVES FOR THE SOUTHERN PACIFIC.

The Harriman Lines have recently received a number of locomotives of the 10-wheel type, part of which were built by the American Locomotive Co. and part by the Baldwin Locomotive Works. Some of these engines were equipped for

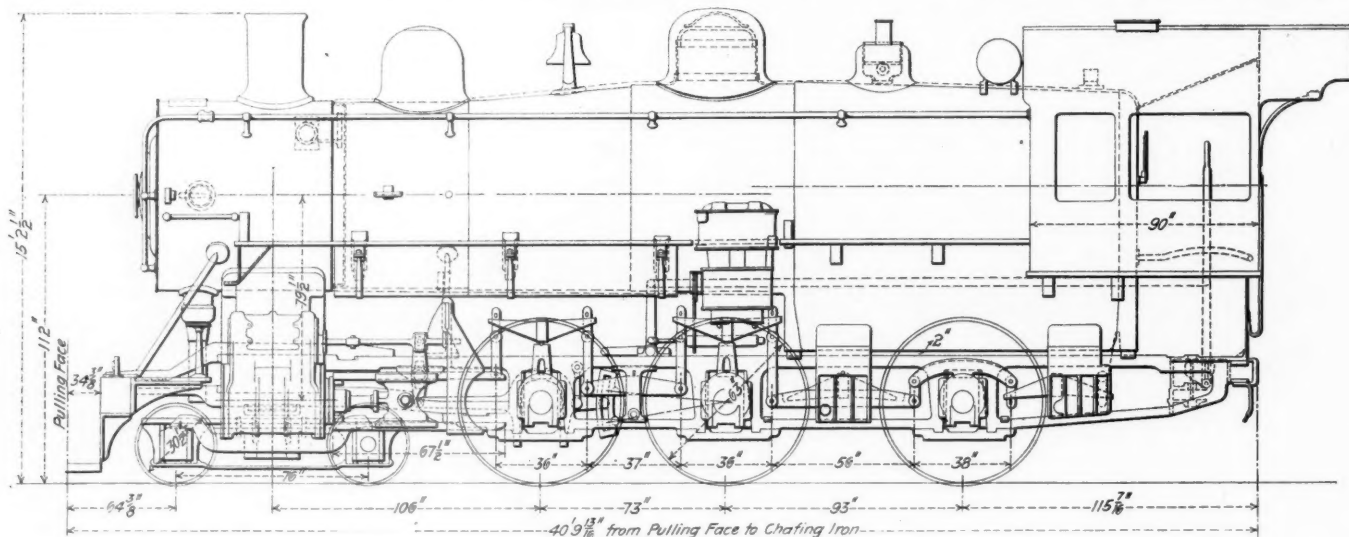


Ten-Wheel Locomotive; Southern Pacific.

printed, but will not be formally presented until the Washington meeting October 13. It was brought out that the lazy jack compensator, as formerly used, did not compensate and would not maintain the pipe lines parallel when on centre. Consequently the committee has redesigned the cranks. Mr. Stevens (Santa Fe) thought that pipe need not be galvanized in all cases, as he had plants in first class condition to-day which were installed ten years ago, the pipe never having been changed. These plants were in dry regions. It was admitted that pipe could be preserved perfectly by proper painting, but

burning oil and the balance for coal. The oil burners were consigned to the Southern Pacific, the Galveston, Harrisburg & San Antonio, the San Antonio & Aransas Pass and the Oregon & California. One of the Southern Pacific engines is shown in the accompanying illustrations. These engines are intended for passenger service. They were built to drawings and specifications furnished by the railroad company and represent the design which has been adopted as standard for this type of engine for all the Harriman Lines.

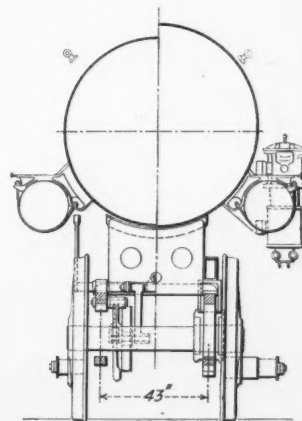
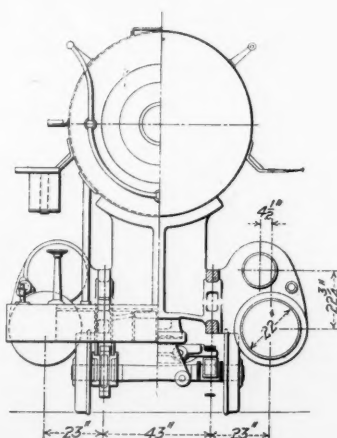
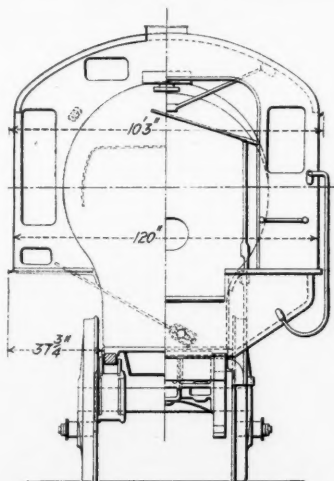
The Southern Pacific is now running heavy passenger



Ten-Wheel Locomotive; Southern Pacific.

trains over the grades between Sacramento, Cal., and Sparks, Nev., with these locomotives. The Sacramento division has comparatively light grades for the first 22 miles east from Sacramento, and the next 32 miles has heavier grades with a maximum of 105.6 ft. per mile. The next 51 miles to the summit has maximum grades of 116.1 ft. per mile, and the remaining 53 miles to Sparks is down hill. Returning from Sparks to Sacramento the greater portion of the first 38 miles has a maximum grade of 79.2 ft. per mile, and the remaining distance

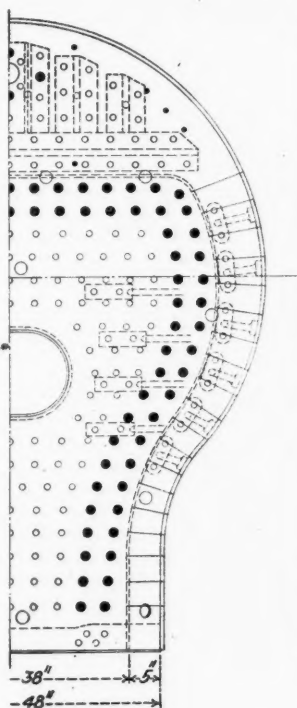
The new engines are performing very satisfactory service. They ride easily, take the curves very steadily and are good steamers. In working order they have a total weight of 207,000 lbs., which places them among the heaviest engines of this type ever built by this company. Of this total weight 162,000 lbs., or 78.6 per cent., is carried on the driving wheels. The cylinders are 22 in. in diameter, with a 28-in. stroke and the boiler pressure is 190 lbs. The driving wheels are 63 in. in diameter. These engines will develop a maximum tractive effort



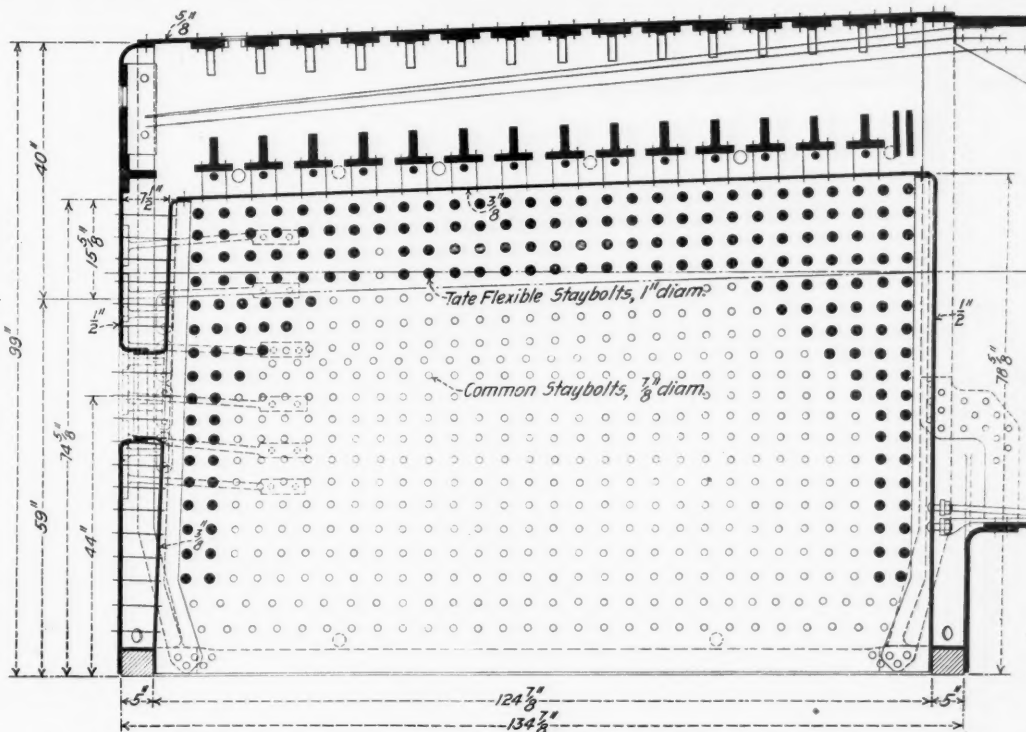
Elevations of Ten-Wheel Locomotive.

to the summit, 15 miles, has a maximum grade of 105.6 ft. per mile. The new 10-wheel locomotives are hauling trains 4, 6 and 24, when they consist of not more than seven cars from Sacramento to Sparks. These trains weigh from 350 to 375 tons, exclusive of engine and tender. The average speed per hour from Sacramento to Sparks, including stops, is 15.5 miles per hour. From Sparks to Sacramento the engines handle, without a helper, the Overland Limited, consisting of seven heavy cars, weighing 411 tons, on schedule time, the average speed, including stops, being about 19.5 miles per hour.

of 34,740 lbs. This gives a factor of adhesion of 4.68. The piston valves have a maximum travel of 6 in. and 1-in. steam lap and $\frac{1}{16}$ -in. exhaust clearance. The valves are actuated by the Stephenson link motion and are set for $\frac{1}{2}$ -in. lead in full gear. The main frames are of cast steel with double front rails and are $4\frac{1}{2}$ in. wide. The boiler is of the wagon top crown bar type with vertical backhead and throat sheet. The barrel is built up of three courses, the outside diameter of the first course being 72 in. It contains 355 2-in. tubes, spaced so as to provide $\frac{7}{8}$ -in. bridges in accordance with the standard



Rear Elevation of Boiler.



Longitudinal Section of Firebox; 10-Wheel Locomotive for Southern Pacific.

practice of the Harriman Lines. The total heating surface of the boiler is 2,994 sq. ft., of which 2,788 sq. ft. is tube surface. The firebox is 124 $\frac{1}{4}$ in. long and 38 in. wide. The crown sheet is supported by T-iron crown bars attached by sling stays to curved T-irons riveted to the roof. The crown and sides of the firebox are in one sheet as are also the sides and roof of the boiler. Ample water space is provided around the firebox, the mud ring being 5 in. wide on all sides and the water spaces increasing in width at the crown sheet. The firebox differs, therefore, from that of the usual construction in that it not only has the sling-stay construction for the whole length of the crown, but has a much wider water leg than usual. In addition to this it will be noticed that there is a very liberal use of flexible staybolts. They are used in double rows vertically at the front and back ends and in four rows across the top, with clusters in the upper corners at both front and back. Owing to the great width of the foundation ring and the fact that the water space increases very rapidly towards the top, a further staying of the backhead other than that afforded by the staybolts is necessary, and Crawford braces are strung along the sides to stay that part of the backhead which is opposite the water leg. This gives the firebox great latitude of movement under the influence of varying temperatures without putting an excessive stress on the sheets. The construction is one that is necessary and has been developed in connection with oil burning locomotives where there are wide variations in firebox temperatures and where these temperatures are apt to be very high.

The tender is of the Vanderbilt type with cylindrical tank having a water capacity of 7,000 gals. The fuel oil is carried in a 2,940-gal. tank located in the coal space of the tender. The tender trucks are of the Andrews cast steel side frame type, the wheels being of rolled steel 33 $\frac{1}{2}$ in. in diameter.

The following are some of the principal dimensions of these engines:

Cylinders, diameter	22 in.
Piston stroke	28 "
Wheel base, driving wheel	13 ft. 10 "
" " total	25 " 10 "
" " engine and tender	58 ft. 0 $\frac{3}{16}$ "
Weight on drivers	162,800 lbs.
" total	207,000 "
" engine and tender	349,000 "
Heating surface, tubes	2,788 sq. ft.
" " firebox	206 "
" " total	2,994 "
Grate area	32.1 "
Journals, main driving	10 in. x 12 in.
" trailing driving	9 " x 12 "
" front truck	6 " x 10 "
" tender	5 $\frac{1}{2}$ " x 10 "
Roller diameter, first ring	72 "
Fuel	Oil
Steam pressure	190 lbs.
Firebox, length	124 in.
" width	37 $\frac{1}{4}$ "
" thickness, side, back and crown sheets	3 $\frac{3}{8}$ "
" " tubesheet	1 $\frac{1}{2}$ "
" water space	5 "
Tubes, number	355
" diameter	2 in.
" length	15 ft.
" material	Steel
Grate	Paxton-Mitchell oil burners
Valves, travel	.6 in.
" lap	.1 "
" clearance (exhaust)	1 $\frac{1}{16}$ -in.
" lead	1 $\frac{1}{32}$ -in.
Wheels, diameter, drivers	63 in.
" " truck	30 $\frac{1}{2}$ "
" " tender	33 $\frac{1}{2}$ "
Tank capacity, water	7,000 gals.
Tank capacity, fuel	2,940 gals.
Tractive effort	34,740 lbs.

Weight on drivers	=	4.68
Tractive effort		
Total weight	=	5.95
Tractive effort		
Tractive effort x diameter of drivers	=	731.0
Heating surface		
Heating surface	=	93.2
Grate area		
Firebox heating surface	=	6.8*
Total heating surface		

*Per cent.

Weight on drivers	=	54.3
Heating surface		
Total weight	=	69.1
Heating surface		
Displacement of both cylinders, cu. ft.	=	12.32
Total heating surface	=	243.0
Displacement of both cylinders		
Grate area	=	2.6
Displacement of both cylinders		

CABLE HAULING ON THE NEW MANHATTAN BRIDGE.

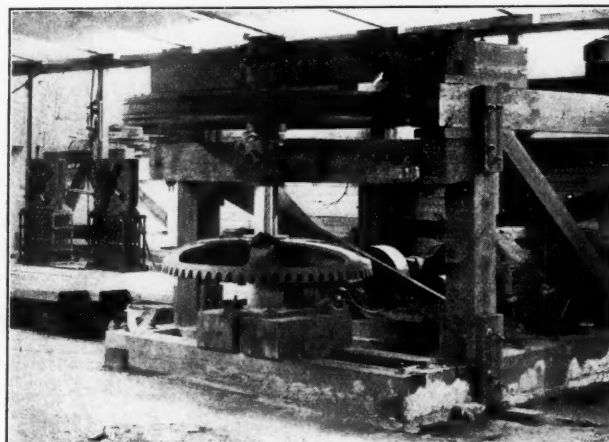
The four cables that will support the new Manhattan bridge, connecting the boroughs of Brooklyn and Manhattan, New York City, are now being hauled into place. Each cable will contain 37 strands of 256 wires each, a total of 9,472 wires in each cable, which must be strung wire by wire.

The wires in each cable are being strung by two traveling



View from Top of Anchorage.

sheaves carried on opposite legs of an endless steel rope. Each sheave consists of a three foot grooved wheel fastened to the hauling rope by wrought iron brackets. The hauling rope is $\frac{3}{4}$ -in. in diameter, and runs above the position of the bridge cables on heavy rollers, supported on uprights on the temporary foot bridges. There are five of these hauling rope supports on the center span, two on each end span and one on each tower. The hauling sheaves move back and forth across the bridge from anchorage to anchorage, a distance of 3,223 ft.



Motor With Driving Mechanism.

They are attached to each leg of the hauling rope so that they move in opposite directions across the bridge.

The wire is delivered to the anchorages of the bridge on large reels or spools, weighing three tons each. The end of the wire from a reel at each end of the bridge is put over the hauling sheave and fastened to the anchorage. The sheaves move across the bridge, unwinding one wire from each reel. Two wires are thus strung by each sheave. When the sheave reaches the opposite side of the bridge the bight of the wire is taken off and made fast to the anchorage, and a new wire hauled back on the return trip. The wires are laid in temporary saddles of four-grooved pulleys at each anchorage. As the hauling of each strand of 256 wires is completed, the wires

are bound together at intervals, and the strand is lifted from the temporary saddle by a chain hoist and laid in its proper place in the permanent saddle. Two strands of each cable are wound simultaneously by the two sheaves of each hauling rope. There is a separate hauling mechanism for each of the four bridge cables, so that they are strung independently of each other. Delays are therefore not cumulative, and delays in one cable affect that cable only. This results in a considerable saving of time.

Each hauling rope is driven by a 50-h. p., 220-volt Crocker-Wheeler form W motor. This type of motor was designed by the Crocker-Wheeler Co., Ampere, N. J., for rolling mill duty, and is well adapted to work of this kind, where sudden overloads and frequent startings and stoppings are likely. The motors are fully enclosed and are designed to withstand all

kinds of weather and rough handling. The driving mechanism is shown in the illustrations. Each motor is geared to a countershaft at a ratio of 5 to 1, and the countershaft is bevel-gear to the driving shaft at a 5 to 1 ratio. On the driving shaft, above the gears, is a wood-lined and grooved, 6-ft. traction wheel, which drives the hauling rope. A 5-ft. idler wheel is also provided so that the hauling rope passes the traction wheel twice, to get the necessary grip. The hauling rope moves about 480 ft. per min., carrying the sheaves across the river in about 7 or 8 minutes. Allowing for the time used in attaching wires at each end, about three trips are made per hour. It is estimated that at this rate the work of hauling will take four months, some time being consumed in fixing

guide wires for each strand and in adjusting the wires after they are hauled. The driving motors are all located on the anchorage at the Brooklyn end of the bridge. The reels of wire are stored at both ends of the bridge. The wire was delivered by John A. Roebling's Sons Co., Trenton, N. J., the same people who delivered the wire for the old Brooklyn Bridge, 30 years ago. The work of building the cables is being carried on by the Glyndon Contracting Co., New York. The hauling equipment for this bridge differs from any previous attempt. In hauling the cables for the Williamsburg bridge, two steam engines were used, connected to the same driving shaft. It later became necessary to cut this shaft and use the engines independently to avoid cumulation of delays. Even with that arrangement, only two cables could be hauled simultaneously.



Brooklyn Anchorage; Manhattan Bridge.

THE PRODUCER GAS POWER PLANT OF THE MINNEAPOLIS & ST. LOUIS.

BY H. COLE ESTEP.

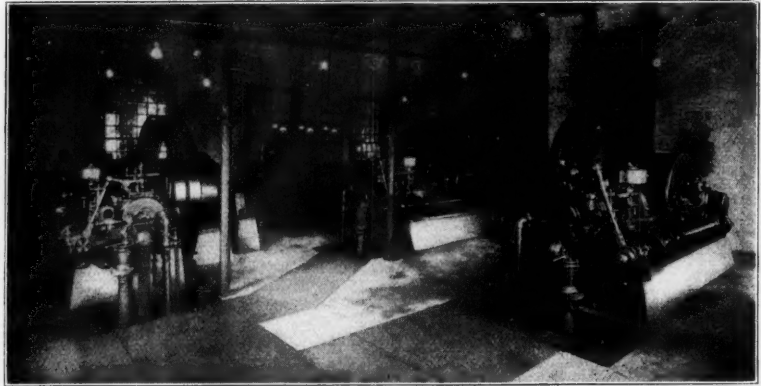
A vacant space in the boiler-house, marking conspicuously the absence of four 100-h.p. return tubular boilers, a melancholy old simple, side crank, steam engine, ignominiously scrapped, a long line of high-pressure steam piping abandoned, a roomy coal bin empty; three neat, silently busy gas producers, and four gas engines ranging from 27 to 140 h.p., throbbing steadily at their work, differentiate the repair shops of the Minneapolis & St. Louis Railroad from all others in the country. This is the only railroad shop in the United States run exclusively by producer gas engines. The new power has been in use since July, 1907, allowing ample time to reach a fair judgment of its merits and defects.

Railroad engineers and master mechanics are proverbially partial to the steam engine. But the gas engine has clearly demonstrated its superiority in this instance, and it is the purpose of this paper to show fairly, accurately and concisely just where this superiority lies. There will, therefore, be given a brief account of the service for which power is needed and the conditions of its employment, a short description of the old steam plant, a more detailed one of the new system, and a comparison of the performance of the gas-driven and steam-driven installations.

Power is needed in the following quantities: For lighting all the buildings 20 k.w. or 27 h.p.; for driving the machine shop, blacksmith shop and boiler shop, 80 h.p.; for driving the car shop, 140 h.p.; total, 247 h.p. The three-wire, direct-current, 110-220 volt system is used for lighting. The machine shop, approximately 200 by 100 ft. in size, is fitted with the usual arrangement of line and counter shafting, belt-driven directly from the main jack shaft. The boiler and blacksmith shop, about 150 by 100 ft. in size and 200 ft. from and parallel to the machine shop, receives its power by a cable drive from a jack shaft in the machine shop. The car shop,

machines are belted to the line shafting. In general, power is employed in this plant under conditions such as are found in any American railroad shop, there being no peculiar circumstances which militate either in favor of or against gas engine drive.

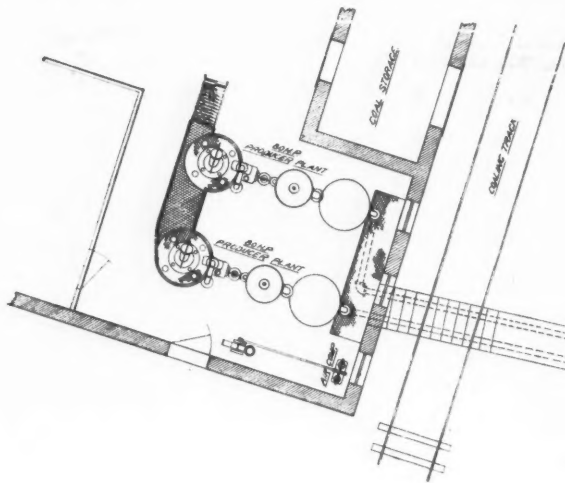
The original steam plant consisted of four ordinary 100 h.p. return tubular boilers carrying steam at 120 lbs. pressure, and a simple, high-pressure, non-condensing 16 $\frac{1}{2}$ in. x 30 in., 70 r.p.m. Cooper engine. The engine was 70 ft. from the



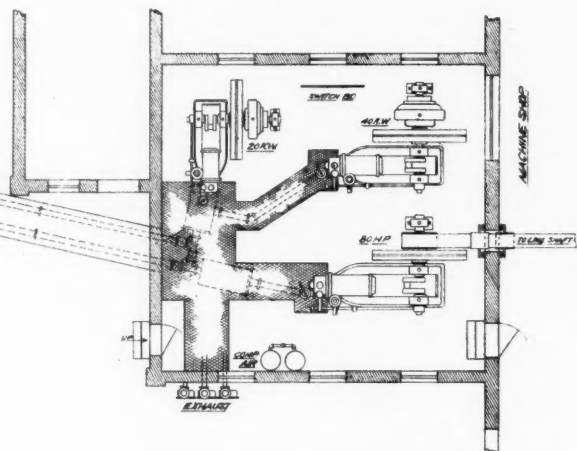
Engine Room; Minneapolis & St. Louis Producer Gas Installation.

boilers. Iowa bituminous coal of poor quality was used for fuel. The boilers may be said to have had an economy of 8 lbs. of water (evaporated at 120 lbs. pressure) per pound of coal, while the engine consumed 35 lbs. of steam per indicated horse-power per hour.

Four Munzel gas engines and three suction producers designed, built and erected by the Minneapolis Steel & Machinery Company, have superseded this steam equipment. A 27-h.p. engine direct-connected to a 20-k.w., 220-r.p.m., three-wire generator used for lighting; a 55-h.p. engine direct-connected to a 40-k.w., 250-volt, direct-current generator held as a reserve unit, and an 80-h.p., 180-r.p.m. engine belted to the machine, blacksmith and boiler shop tools are grouped in an engine room adjacent to the machine shop. The gas for these three engines is made in two 80-h.p. suction producers in the boiler house 40 ft. away. The producers are 4 ft. 8 $\frac{3}{4}$ in. in diameter and 6 ft. 9 in. high, each covering 58.5 sq. ft. of floor space. They are self-contained, furnish their own steam and



Plan of Plant, Showing Producers, Engines and Piping.



formerly driven by a continuation of this cable drive, is now direct-connected to a 140-h.p. gas engine. The shops are run 10 hours daily under normal conditions, and for longer periods during rush times. The amount of electricity used varies, of course, with the season and weather. A reserve electric motor is at hand for driving the machine shop on emergency occasions. It is proposed to install a new wheel lathe, which will be driven by an individual motor, but at present all the

are each equipped with a scrubber and auxiliary purifier. The fuel used is a high grade mixture of pea and buckwheat anthracite coal. A 6 in. gas main from each producer conveys the gas to the engines. An auxiliary 3-h.p. gasoline engine supplies the blast used in "blowing up" the producers, and the compressed air by means of which the main engines are started.

The engines are of the four-cycle type, water cooled, ignited

by a low tension oscillating magneto. They are started with compressed air, are massive in design and are furnished with extra heavy flywheels, insuring close regulation. The car shop is driven by an isolated 140-h.p. engine, direct connected to a 140-h.p. producer. The 140-h.p. plant is precisely similar in design to the smaller units.

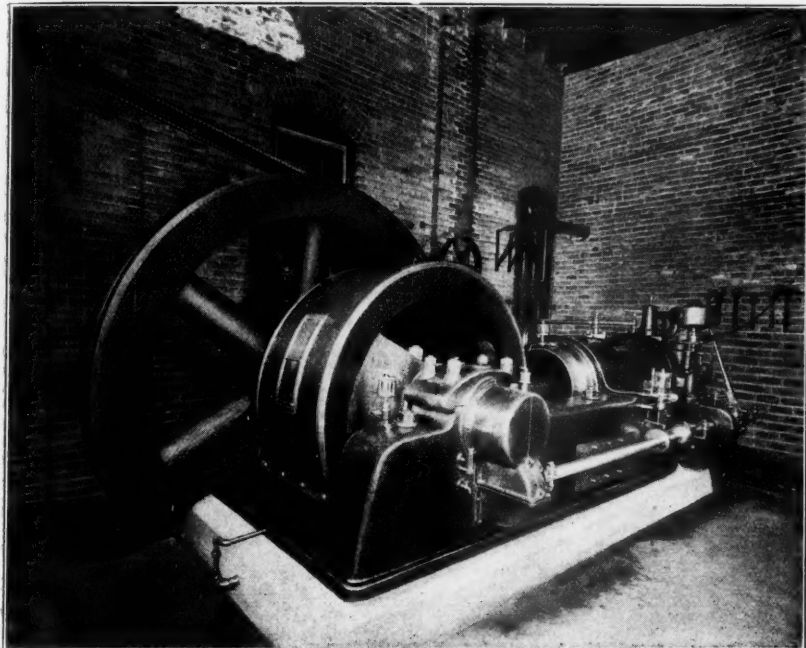
Immediately back of the Minneapolis & St. Louis shops is

discarding the old boilers two less men are required in the fire room, which reduction represents the saving in labor cost due to the new system.

Definite figures regarding the relative fixed charges of the two systems are not available owing to the short time that the gas engines have been in service. The prevailing opinion, however, is that the gas engines have not caused any marked reduction in fixed charges: interest, depreciation and insurance.

The foregoing shows that in this plant the gas engine has proven itself to be a vastly more economical source of power than the steam engine. Has it, however, made an equally enviable record in the matter of continuity of service, freedom from breakdowns, or reliability? The following facts show that it has. The new plant has been in continuous service for nine months and has not been shut down once for extraordinary repairs. Since the system has been in operation the work in the shops has never been delayed through any failure of the gas engines or producers. One engine and producer ran continuously, day and night, for 14 weeks, at the end of which time it was shut down voluntarily. The gas engine system is reliable; judging from this record one might almost say absolutely reliable.

In view of these results obtained with gas engines at the Minneapolis & St. Louis shops we may conclude that this new power, in reasonable sizes, will in time supplant the steam

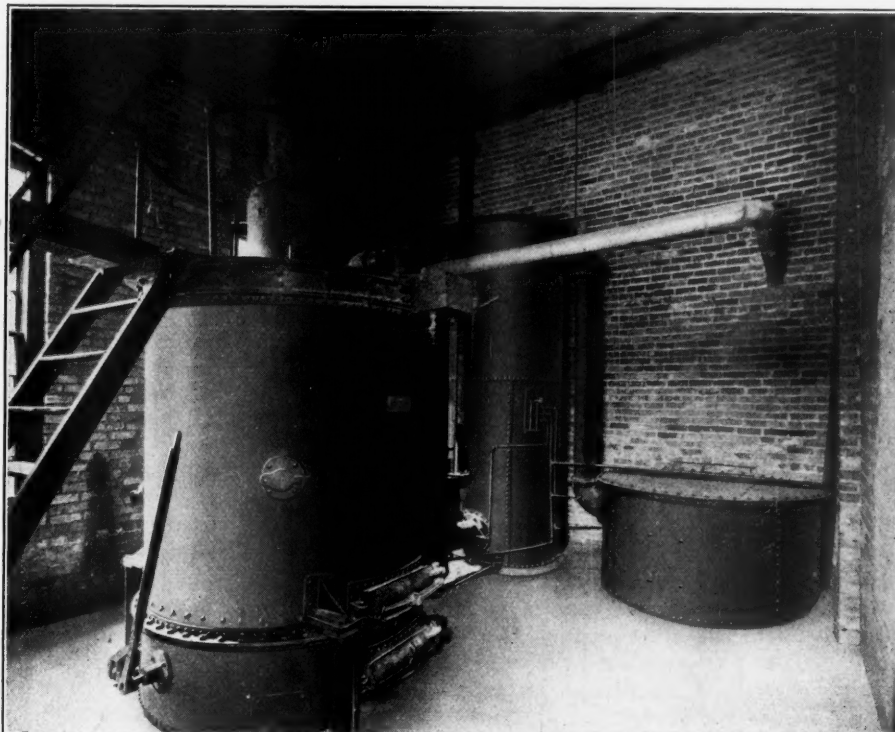


140 H.P. Gas Engine; Minneapolis & St. Louis.

Kenwood Hill, one of the select residence districts of Minneapolis. The smoke from the old steam plant was objectionable to the residents on the hill, and it was to eliminate this nuisance, rather than for purposes of economy, that the producer gas plant was installed. This smoke evil has been absolutely eradicated, co-ordinate with a marked gain in economy in the production of power for the shops.

Turning now to a comparison of the service rendered by the gas plant with that given by the old steam installation, we have two principal factors to consider; economy of operation, considering both fuel and labor costs, and continuity or reliability of service. The old steam plant was neither exceptionally bad nor unusually good. A fuel consumption of 6 lbs. of Iowa coal per brake horse-power hour is a reasonable estimate, erring, if at all, on the conservative side. This coal is valued at \$3 per ton delivered to the boiler room. Therefore the old steam plant delivered a brake horse-power-hour for 0.9 cent.

The gas engine, under normal operating conditions, generates a brake horse-power for one hour on 11½ lbs. of anthracite pea and buckwheat mixture, worth \$5 per ton. This means that the gas engines are furnishing a brake horse-power-hour for 0.31 cents. The steam plant, considering fuel alone, therefore costs three times as much to operate as the gas engine system. The engine room force is the same for the gas engines as was employed with the steam plant. By



140 H.P. Gas Producer; Minneapolis & St. Louis.

engine wherever anthracite coal can be had at a reasonable price.

The shops of the Natal State Railroad have begun building cars not only for the Natal railroads, but for other South African railroads. Nearly all the materials must be imported, and wages are very high in South Africa.

TRAIN ACCIDENTS IN AUGUST.¹

Following is a list of the most notable train accidents that occurred on the railroads of the United States in the month of August, 1908. This record is intended to include usually only those accidents which result in fatal injury to a passenger or an employee or which are of special interest to operating officers. It is based on accounts published in local daily newspapers, except in the cases of accidents of such magnitude that it seems proper to write to the railroad manager for details or for confirmation.

Collisions.

Date.	Road.	Place.	Kind of		No. persons reported	
			Accident.	Train.	Kil'd.	Inj'd.
*9.	G. & H. . . .	Galveston.	rc.	P. & P.	1	7
14.	S. A. & A. P. . .	Yoakum.	bc.	P. & Ft.	0	6
17.	Northern Pac. . .	Woodinville.	bc.	P. & Ft.	2	5
26.	St. L. & S. F. . .	Hamden, Okla.	bc.	P. & Ft.	3	5
27.	Chi. & N.-W. . . .	Milbridge.	bc.	P. & Ft.	3	17
†30.	Chi. & N.-W. . . .	Kilgore.	rc.	Ft. & Ft.	3	1

Derailments.

Date.	Road.	Place.	Cause of dermt.	Kind of train.	No. persons reported	
					Kil'd.	Inj'd.
3.	A. T. & S. F. . .	Hado.	b. rail.	Pass.	0	18
*7.	St. L. & S. F. . .	Imboden.	—	Pass.	3	4
7.	Colo. & Sou. . . .	Trinidad.	flood.	Ft.	2	0
8.	Southern Pac. . .	New Orleans.	malice.	Pass.	1	0
†9.	Tonopah & T. . .	Shoshone.	washout.	Pass.	3	0
10.	Northern Pac. . .	Ellard.	bad bdgs.	Pass.	2	20
20.	St. L., I.M. & S. .	Illinois, Okla.	unx.	Pass.	0	13
23.	Southern	Suwanee, Ga.	malice.	Pass.	1	2
23.	Southern Pac. . .	Irving.	acc. obst.	Pass.	4	6
23.	Seaboard A. L. . .	Richland.	landslide.	Pass.	2	0
25.	N. O. & G. N. . .	Little Woods.	d. track.	Pass.	0	20
26.	St. L. & S. F. . .	Brandsville.	d. track.	Pass.	2	4
26.	Texas & Pac. . .	Marshall.	unx.	Ft.	1	3

Other Accidents.

18.	Pennsylvania . .	Bristol.	b. cyl. hd.	Pass.	2	5
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Of the half dozen electric car accidents reported in the

newspapers in August which were of considerable consequence, the most serious was a butting collision near Piqua, Ohio, on the eleventh, said to have been due to a mistake in a despatcher's order. In this collision five persons were reported killed and 40 injured. One person was killed and one injured at Unionville, Conn., and at Hibernia, Ohio, three were reported as fatally injured.

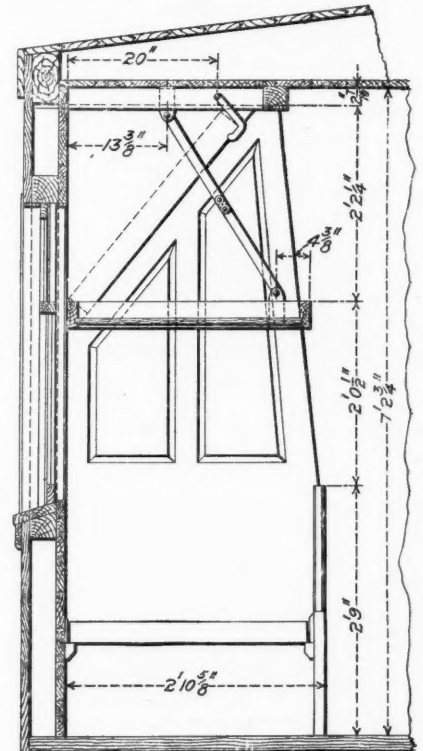
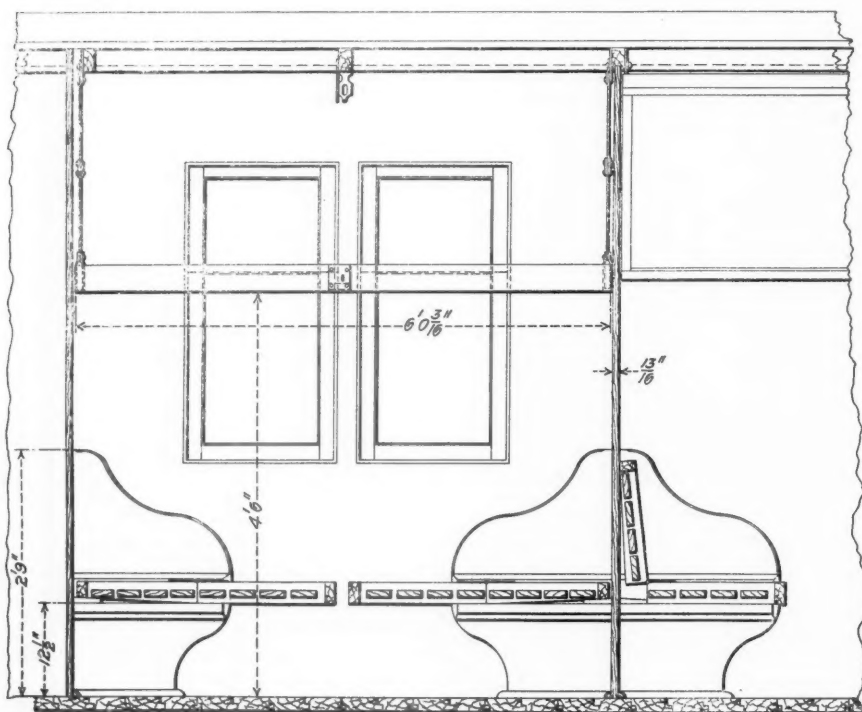
DROVERS' CARS FOR THE ATCHISON.

In the *Railroad Age Gazette* of August 21 appeared a short article, with two illustrations, made from photographs of interior views, describing the new cars built by the Atchison, Topeka & Santa Fe for the use of stockmen traveling with shipments of livestock destined for the Kansas City market. E. Posson, Engineer of Car Construction of the Santa Fe, has supplied the following additional information regarding the car and bunk construction.

The cars are built of wood, with a steel subframe similar to those now being used to reinforce light wooden cars and also for some new cars on the Santa Fe. This subframe was described in the *Railroad Age Gazette*, issues of June 12 and 19. This construction gives ample strength to resist the pulling and buffing stresses of the heavy stock trains in which the cars are run, and also provides an important factor of safety in case of collision. The cars are mounted on the Santa Fe's standard way-car truck, which has elliptic springs and Barber rollers, making the cars easy riding. The weight of the car is 45,000 lbs.

Details of the bunk arrangement are shown in the accompanying cut. The upper bunk, when not in use, is raised, being held up by a hook secured to the carline and locked by a hasp beside the hook. It is made of yellow pine slats in an ash frame and holds the blankets, etc., when they are not in use. The lower bunk is made up by pulling the seat bottoms forward to bridge the opening between seats. The backs, which are hinged at the bottom, drop down to a horizontal position. There is a closet and two lavatories in the car and a stove for heating in winter. The oil lamps for lighting are enclosed in cages. These cars run behind the cabooses of stock trains.

¹ Abbreviations and marks used in Accident List:
rc, Rear collision—bc, Butting collision—xe, other collisions
—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, unexplained—derail, Open derailing switch—ms, Misplaced switch—acc. obst., Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of boiler of locomotive on road—fire, Cars burned while running—P., or Pass., passenger train—F., or Ft., freight train (includes empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.



Sectional Elevations Through Bunks; Atchison Drovers' Cars.

THE THEORY OF RAILROAD RATES.

BY WILLIAM Z. RIPLEY,
Professor of Economics, Harvard University.

IV.

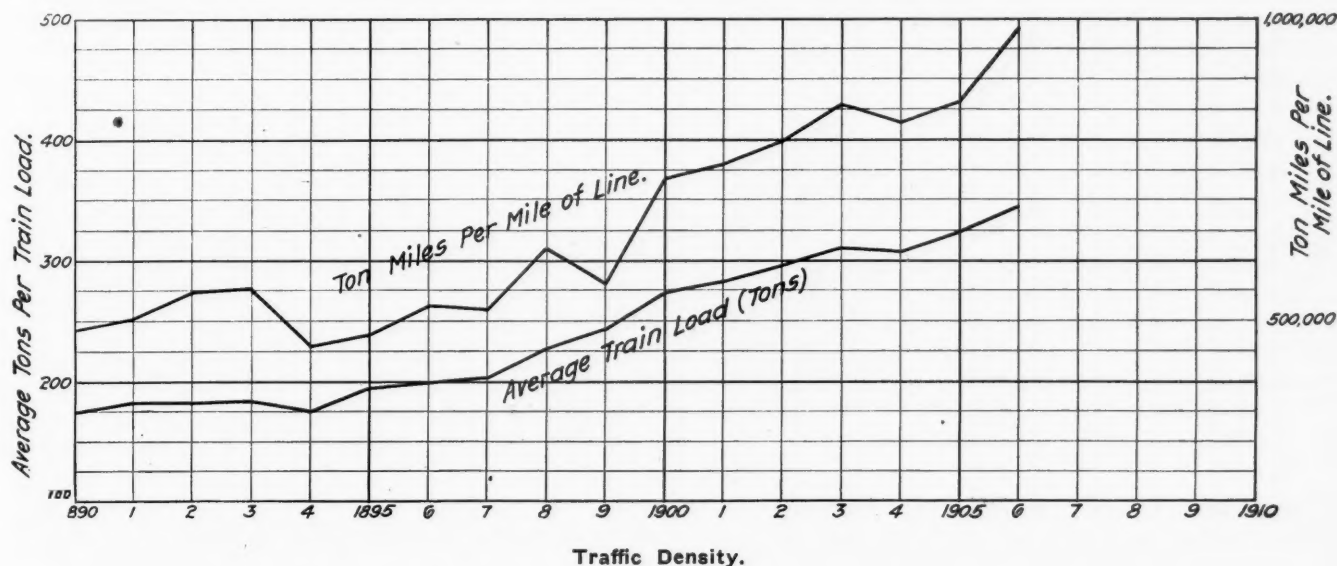
Traffic density has enormously increased during the last two decades, as a result of the filling up of the country and the relative cessation of new construction. This is manifested by the next diagram, showing the growth since 1890. In that year the density was less than 500,000 ton-miles per mile of line, and during the depression of 1893 it fell well below that figure. The total of 982,401 reported for 1906 represents, therefore, more than a doubling of the density in 17 years. This growth during 1905-06 is notable. It was a time when congestion upon all the roads of the country occasioned much distress. This diagram evidences the fact that the country has well grown up to the measure of its existing transportation facilities. Until the limit of utilization of these transportation facilities is reached, it is also evident why the profits of the companies have grown so fast.

The second measure of effective operation for the production of increasing returns is concentration in the train load. This is regarded by many as the supreme test of efficiency. Great

between roads of different type, as well as progress from year to year:

	1905	1904	1903	1901
Pennsylvania	557	508	493	511
Chesapeake & Ohio.....	...	447	446	381
Great Northern .....	...	400	406	375
Erie .....	...	359	368	351
New York Central .....	...	339	326	324
Northern Pacific	281	270	280	243
Atchison	238	225	231	232
Chicago & North-Western...	222	208	218	208
New Haven .....	...	190	193	192
Southern .....	...	...	...	...

The great coal and iron roads, the trunk lines and the trans-continental lines all concentrate their business; while the granger roads like the Atchison and North-Western, the roads with much local business like the New Haven, and the Southern, operating in sparsely settled regions, all have of necessity smaller trainloads. But all alike betray remarkable progress in this regard. In 1870 the average for the best roads was little above 100 tons; such as 103 tons reported for the New York Central and 137 tons on the Lake Shore. From this level to results of 400 or 500 tons on the average represents a notable achievement. The significance of these recent figures can be realized from the fact that the London & North Western, one of the leading railroads in Great Britain, reports recently an average freight trainload of only 68 tons. This represents probably a fair average for European railroads as



progress has been made during the past years in this regard in the United States—an improvement which has enabled the carriers to bear up under a declining scale of freight rates.

The train load is generally adopted to-day as the unit of operation, measuring the cost of service.

It is a fact that within certain limits, the cost of handling this unit does not vary greatly with its capacity. Since the first application of air-brakes to freight trains in 1887, a train crew sufficient to handle 15 cars can care for 30 about as well in long-haul wholesale business. Fuel cost also, as has been shown, lags well behind the rate of increase of the load. Eaton, in his Railroad Operations, concluded that from 30 to 50 per cent. of cost is independent of the train load. The effect is that any increment in the paying load very materially decreases the cost of operation per ton.

Progress in the United States in increasing the average train load is shown by the preceding diagram. The scale applicable is along the left-hand side of the chart. From 175 tons per train in 1890 to practically double that figure in 1906 is certainly a remarkable showing. The most rapid increase seems to have occurred after 1897, with resumption of general prosperity. As for individual roads, the following graded table of average train loads is suggestive, as showing the gradation

a whole, although in England the general practice of privately owned cars, of light locomotives, short freight sidings, etc., may reduce the figure slightly below the Continental average. This table not only shows the notable improvement in recent years; it at the same time shows how the trainload performance is affected by trade conditions. For nearly every road the trainloads for 1904 are distinctly lower than in the preceding years. This was a year of acute business depression. The movement of great staple commodities, such as iron ore, coal, steel and iron and lumber, was greatly curtailed. All business was conducted on a narrower basis. Smaller trainloads were an almost inevitable consequence. The revival in the following year, however, immediately improved the conditions of operation, as the figures indicate.

It will be noted that the figures for the American roads above given represent averages. These are compounded from local and through traffic taken together. It is apparent at once that local trains must average far lighter loads than are customary upon long hauls without breaking bulk. Thus New England railroads report for 1906 an average trainload of only 220 tons, while other parts of the country, such as the North Central group, report 426 tons of paying load. Only by separation of local from through business can we adequately appreciate the enormous advances which have taken place

in railroad operation in the United States, with corresponding reductions in the cost of transportation. While the New York Central at one time reported an average trainload of 322 tons, the average load of their through trains on the main line rose as high as 750 tons. More than twice this figure is attained upon the Pittsburgh, Bessemer & Lake Erie road in hauling ore from the lakes to the furnaces at Pittsburgh. The Illinois Central, for its low grade and long haul to the Gulf, has recently built locomotives capable of hauling 2,000 tons of net paying load. A standard grain train on the Lake Shore in 1903 consisted of 50 cars holding 40 tons each. Even this figure has recently been surpassed by the New York Central, which, with its monster new "mogul" engines, hauls 80 loaded 30-ton cars, giving 2,400 tons of revenue freight. Seventy-five grain cars holding 1,000 bu. apiece are equivalent to the production of 20 bu. per acre of an area of six square miles. This is an ordinary trainload. It is not infrequent to transport a fifth more than this. Eighty and 100 cars in a train since 1900 often bring the load up to 3,600 and even 4,000 tons of freight. Such a train is over four-fifths of a mile long. From these figures it certainly appears that trainloads for long haul are standardized at not less than 2,000 tons, a figure which would have seemed absolutely impossible to railroad managers of even ten or fifteen years ago. The maximum trainload in Germany on coal traffic, which, of course, greatly exceeds any general average for trains of all classes, is about 500 tons. It has been regarded as a notable achievement that this represents an increase of about 100 tons in the last decade.

On the other hand, the extravagant promises of economy from large trainloads have been considerably abated of late. It has been effectively demonstrated that there is a limit to such growth. Only low grade and long haul carload traffic can profitably be concentrated. In 1903, for instance, a general decrease in trainloads followed a reduction in the relative amounts of low as compared with high-grade tonnage. Less iron, coal and raw materials and more merchandise and manufactures offered for carriage necessitated a positive reduction in the trainloads as shown by our table. Nor can local business in less than carload lots profitably be concentrated beyond a certain point. Grades must be uniform to attain such economy. The trainload must not exceed the traction power on the heaviest inclines, or else expensive pusher engines or breaking up of trains will offset all other savings. Moreover, too great trainloads even on the best roadbeds involve slower speeds. Not only is other traffic thus impeded, but the economy in wages vanishes after a certain point with such slower movement. The fashion had been set by James J. Hill, the master mind in the transcontinental field. His notable results, due to a careful working out of every detail, led to a frenzied imitation on all sides. Many roads then discovered to their loss that while they had provided rolling stock for heavy loading, that ampler terminals, longer sidings and heavier bridges were a necessary accompaniment. Part of the congestion of traffic in 1906-7, already mentioned, and a portion of the financial embarrassments of recent years, were undoubtedly due to too great haste in seeking economies of this sort in rolling stock, without at the same time making provisions for enlargement of other portions of the plant. A more discriminating policy has consequently resulted of late. Traffic is being sorted according to its availability for concentration. The best utilization of the rails and terminals is being more considered. Business demands for quick delivery also enter into the calculation. Instead of a few huge slow-moving leviathans blocking other trains, the line may perhaps better be kept full of many smaller trains moving more nearly together. Such are certain of the details now being worked out. None of them, however, weaken our main proposition that a discriminating concentration of traffic conduces very greatly to economy of operation.

This concentration of traffic units is largely due to technical improvements of various kinds. Foremost among these has been the development of the steel rail. In 1880 more than seven-tenths of our mileage was still equipped with iron rails. Rapid progress ensued during the next ten years, upward of 80 per cent. being in steel rails by 1890. At the present time, the proportion is above 98 per cent. In fact, no iron rails have been made for many years, except for repairs and on insignificant branch lines in remote parts of the country. A steady increase in the weight of the rails has ensued. The standard rail for main lines until the Civil War weighed 56 lbs. to the yard. In the seventies this was increased to 63 and above; in the latter eighties the best practice was to use 75-lb. sections. Since 1900, they frequently run as high as 100 lbs., in regions of dense traffic. Few main lines of track now average less than 75 lbs. It is this increase in the use and size of steel rails which has permitted improvements in rolling stock. But on the other hand, grave dissatisfaction with the quality of the rails manufactured of late years, particularly since the establishment of practical monopoly under the United States Steel Corporation has become manifest. Numerous accidents due to breakage of rails, especially since 1905, has revealed either defects in manufacture or an undue load imposed by heavier rolling stock. The matter of improvement is now being seriously considered on all sides.

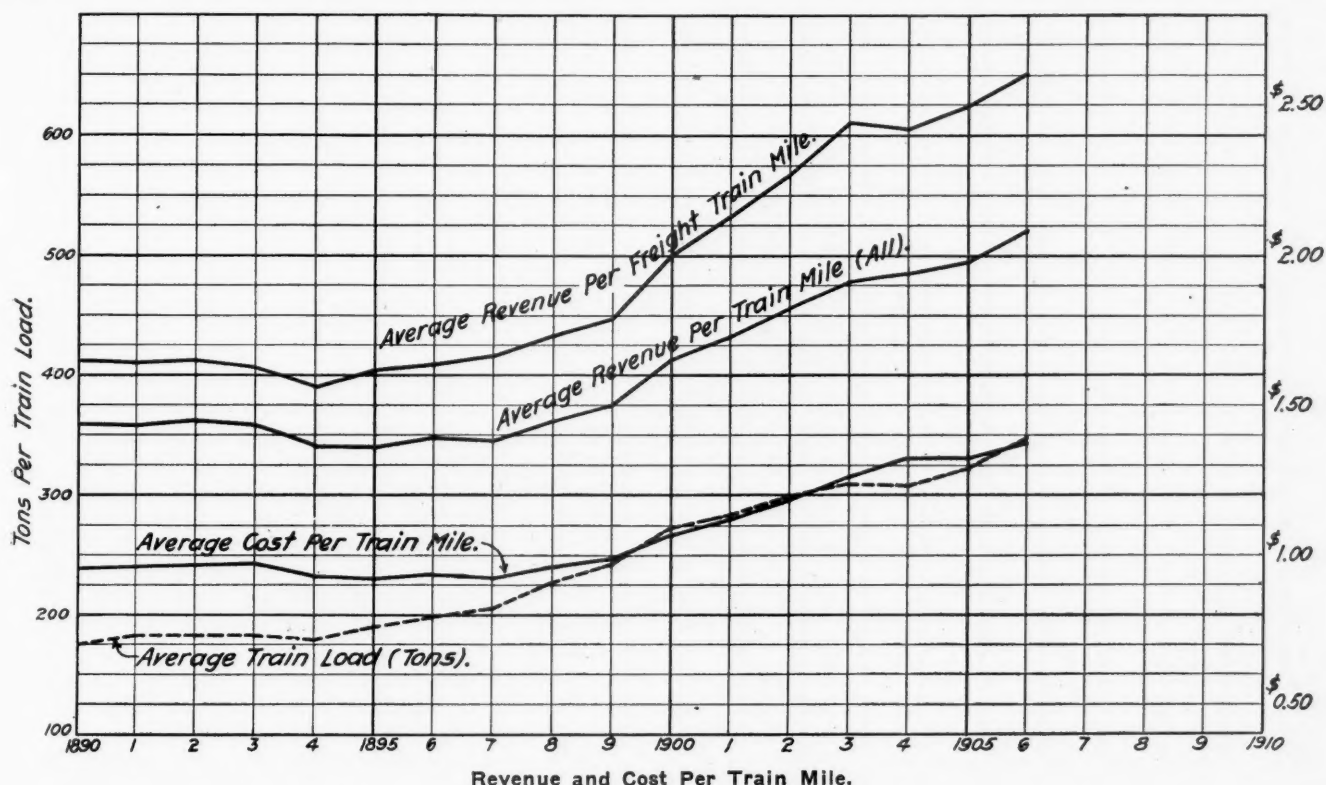
The power and efficiency of locomotives has increased, perhaps, more since 1890, and particularly since 1895, than in any previous period. Superior materials particularly have contributed to this result, such as the substitution of cast steel for cast iron and of nickel steel for wrought iron in axles, crank pins, etc. Some of the improvements which may be mentioned are, for instance, an increase in the average heating surface from 2,000 in 1890 to nearly 3,000 sq. ft. at the present time, and an increase in the average steam pressure from 160 lbs. to 210 lbs. per square inch in the same period. The maximum weight has also increased very rapidly. The average weight of a locomotive at the close of the civil war was approximately 90,000 lbs. This has increased in somewhat the following proportions: To 1881, 102,000 lbs.; to 1893, 135,000 lbs.; to 1895, 148,000 lbs.; to 1898, 230,000 lbs.; rising in 1900 to 250,000 lbs. Passenger locomotives since 1892 have almost doubled in weight, and freight engines have more than done so. Compound locomotives are also supplanting those of simpler type for peculiarly heavy service. The first of these was built in 1899, only one being constructed in that year. In 1900 a single locomotive works turned out 500—a number constituting two-thirds of the entire output of that company—for use in the United States. Such locomotives cost more in first instance, but the greater weight and steam capacity, together with the considerable saving in fuel, amounting to perhaps 20 per cent., more than offset this objection. The traction efficiency of these improved locomotives may be shown by the statement that in 1885 the decapod Baldwin locomotives, made to haul 3,600 tons on a level, represented the maximum capacity. Five years later the same company built locomotives to haul 4,000 tons, not only on a level, but on any ordinary grade. As indicative of the very latest advances in locomotive construction, we may instance those built recently for the Illinois Central and the Union Railroad at Pittsburgh, both low-grade roads, carrying exceedingly heavy train loads. The first of these weighed, including its tender, 365,000 lbs., the Union Railroad consolidation engines weighing 334,000 lbs. Such locomotives are stated to be twice as powerful as the best which were manufactured fifteen years ago. As summarizing the increased efficiency of American locomotives, we may instance the figures of the Interstate Commerce Commission, showing the average performance of locomotives for the United States. Whereas in 1894 the average number of tons of freight carried per locomotive was about 32,000 tons, this rose to 46,000 tons in 1899, and to 54,600 tons in 1906. At the same time the number of tons of freight hauled one mile for each

freight locomotive in the United States increased from 4,000,000 in 1894 to approximately 6,000,000 in 1899, and to 7,200,000 in 1906. In other words, the average performance of each freight locomotive in the United States has increased by more than 50 per cent. in the last decade.

The economy of large freight cars has been amply demonstrated. Marked advances in the average capacity have taken place in the last few years. In the sixties a 15,000 lb. freight car represented about the normal capacity. This has increased, as measured by maximum load, to 28,000 lbs. in 1873; to 40,000 lbs. in 1875; to 60,000 lbs. in 1885; to 70,000 lbs. in 1895, while at the present time 80,000 to 100,000 lb. cars are in everyday use. Cars of this latter type, built to carry 40 to 50 tons, are necessarily of pressed steel construction, and are mainly useful for the carriage of coal and ore and similar low-grade commodities. It seems to be questionable whether a maximum capacity has not been about reached, in view of the exceedingly great wear and tear imposed upon track, bridges, etc. Up to this point the economy of heavy loading is indisputably proved. Increased size of cars far

that actual movement under a paying load, allowing for one-third of its journeyings empty, occupies but little over an hour and a quarter a day. The problem how to secure greater efficiency in the use of this equipment is as yet imperfectly solved.

The discussion of the nature of railroad expenditure may be concluded by a comparison of the net effects of the developments of the last few years; that is to say, of steadily expanding costs of operation and of slowly and tardily rising rates chargeable for service on the one hand, as over against the results obtained by mechanical improvements and increasing economy of operation coupled with growth of tonnage on the other. The average cost of transportation has greatly increased. This, according to the statistics of the Interstate Commerce Commission is shown upon the diagram herewith by the lowest curve. The average cost of running all trains per mile, which had fallen from 96 cents in 1890 to 91.8 cents in 1895, rose to \$1.07 in 1900 and in 1906 increased by almost one-third to \$1.37 per mile. Against this should be set the fact that while the trains thus cost about 50 per cent. more



more than proportionately increases the paying load. Thus, for instance, an 18,000-lb. car will carry 20,000 lbs. load, while a 22,000-lb. car will carry a load twice as great. It is stated on good authority, for example, that a car of 40 tons capacity can be built which will weigh but 3,000 lbs. more than a 30-ton car, and cost hardly \$50 more. This is undoubtedly the reason why at the present time the average load per car is at least 100 per cent. greater than the maximum which was allowed 20 years ago. In this connection the data of the Interstate Commerce Commission may be again adduced in proof. This shows a steady increase in the freight performance of American equipment. Whereas in 1894 it required on an average 1,888 freight cars for every 1,000,000 tons of freight transported, their capacity has so increased that the same amount of traffic in 1906 was carried by only 1,127 cars. In other words, an enormous increase in the freight service had been attained. On the other hand, the actual mileage performance of much of this equipment is extraordinarily low. It averages only about 9,000 miles annually or an equivalent of 30 miles a day. At a speed of 15 miles an hour, this means

to haul per mile, their paying load measured by revenue per train-mile for all trains, has increased in somewhat smaller proportion, namely, from \$1.44 per mile in 1890 to \$2.07 in 1906. This is shown by the two upper curves on the diagram above mentioned. For freight trains alone the increase has been much greater, from \$1.65 to \$2.60. This follows from the well-known fact that freight rates have been increased, while passenger rates have not changed for the better during this period; and also that economies in concentration of traffic are necessarily confined to the carriage of freight. The interrelation between these various factors may be more readily shown by confining our attention to the period during which a practically uninterrupted development of business ensued, thus eliminating the confusion due to the four years of depression after 1893. The data on our various charts for the years 1898-1906 demonstrate that during this period the ton mileage, measuring the freight traffic handled, has increased by 98 per cent.—practically doubled in fact. To transport this doubled tonnage, a growth in freight train mileage of only 18 per cent. was necessary. This is due, of course, to the

notable concentration of train loading, already described, as well as to a density of traffic per mile of line almost 60 per cent. greater. As a consequence of this economy in operation, the revenue per freight train mile has increased by about 50 per cent.; while the average cost of running all trains per mile has grown less rapidly, namely, by 42 per cent. Had we data for freight trains alone it would surely be lower than this. In the meantime during this period of eight years, the rate of return in revenue per ton mile received, has remained practically constant. From all of which it would appear that even despite all these confusing factors, the law of increasing returns was making itself appreciably felt.

"COMMODITY CLAUSE" OF I. C. C. LAW UNCONSTITUTIONAL.

At Philadelphia, September 10, the United States Circuit Court for the Eastern District of Pennsylvania dismissed the suits of the Federal Government to enforce the "commodities clause" of the Interstate Commerce law against the anthracite coal carrying railroads, declaring the law harsh, drastic, unreasonable and an invasion of the rights of the states. Judges George Gray and George M. Dallas filed opinions dismissing the suits, and Judge Joseph Buffington dissented, but did not file an opinion.

The "commodities clause" forbids railroad companies to transport in interstate commerce any article or commodity manufactured, mined or produced by them or under their authority, except lumber. The case was argued in June, Attorney-General Bonaparte delivering the principal argument for the government. The effect of the commodities clause, if constitutional, would be to confine the mining of anthracite coal by the railroads to that mined for use in Pennsylvania only, or to compel the railroads to sell all the mining property in which they are interested.

The railroad companies involved are the Central of New Jersey, the Lehigh Valley, the Erie, the Delaware, Lackawanna & Western, the Delaware & Hudson, the Pennsylvania and the Philadelphia & Reading.

Judge Gray gives an exhaustive sketch of the facts and points set up by the defendants, and then states the problem before the Court in these words:

"The fundamental question which presents itself is whether the so-called commodities clause is in excess of the legislative authority granted to Congress by the Constitution."

He next reviews the policy of the State of Pennsylvania with regard to the encouragement of the development of its mineral wealth and of transportation facilities within its borders. Two of the defendant corporations were created by the State for those express purposes. In the year 1905, the last year for which there are authentic statistics, the entire distribution of anthracite coal in the United States and Canada was 61,410,201 tons; and approximately four-fifths of it was transported in interstate commerce over the defendant railroads, and of this between 70 and 75 per cent. was produced by the defendant companies, or through the agency of their subsidiary coal companies.

Judge Gray discusses at great length the Constitutional limitations on the power of Congress. He says:

"The Constitution of the United States was intended for the common understanding of the people. Life, liberty and property are ranked together under the protection of the fifth amendment, and by the exigencies of its command a person can no more be deprived of his property than he can be deprived of his life or his liberty, without due process of law. But, if the contention of the Government be sustained, that in regulating interstate commerce, the consequences, direct as well as indirect and incidental, that injuriously affect the property of a citizen, may be disregarded without respect to their character, the same must be true as to those consequences that affect his liberty.

"The facts set forth in the several answers of these defendants abundantly show that no right of property, in or to the coal owned by them, is so valuable as the right to transport it over their own roads. No refinement of argument, or legal casuistry, if it were permissible in such a case, can conceal the loss resulting from the enforcement of this statute, or make it anything less than a practical and substantive violation of the letter and spirit of the fifth amendment.

"If the propositions laid down by the Attorney-General are sound, it is hard to conceive upon what ground legislation could be challenged which arbitrarily prohibited farmers from carrying their own corn, by their own teams, to market across the boundary line between their own and another state. Such a power would be a mockery of the purpose for which the Constitution was formed, and destroy the freedom of Interstate Commerce, which it was intended to secure."

Counsel for the Government had cited the Congressional legislation against the Louisiana lottery as a precedent for the power asserted in the "commodity clause." Judge Gray shows that the chief basis of this action was the pernicious nature of lottery gambling. He adds:

"Nothing like this is true of the case before us. The traffic sought to be here prohibited was admittedly up to the time of the enactment in question loyal, moral and innocent."

"From every point of view from which we have been able to approach the question, the unreasonableness and consequent invalidity of this so-called 'commodities clause' is apparent. It invades the rights of the state by striking down the liberty hitherto innocently enjoyed by its citizens under the laws and usages of the commonwealth, to engage in interstate commerce to the fullest extent, as to all harmless articles, whether owned or not owned by the carrier, and deprives of their property these defendants, contrary to the letter and spirit of the Fifth Amendment to the Constitution. If the enactment in question be warranted by the commerce clause of the Constitution, it is hard to see what bounds may be set to the expenditure of that power. It will, indeed, be an open door through which the forces of a centralization hitherto unknown may enter at will, to the overthrow of that just balance between federal and state power, for which the makers of the Constitution so wisely provided, as an essential to the preservation of our dual form of government.

"Ample as is the scope of legislative power granted by the language of the commerce clause, and far as the Supreme Court has undoubtedly gone in sustaining the validity of legislation under it, we think it may be safely said that no assertion of this power hitherto, by Congress, has been so far-reaching or affected in so serious a degree the individual liberty and property rights enjoyed under the constitution and laws of a state as the enactment we are here considering. It is not to be denied that the right to carry in interstate commerce coal which they own in whole or in part, or which is mined or produced by them or under their authority, or by coal companies in which they are stockholders was, until the passage of the act in question, a lawful right of these defendants; that it was a common right of property, neither denied nor disputed by the common or statute law of Pennsylvania; that it was a most important property right, the enjoyment and exercise of which was neither criminal nor immoral, and subject only to any restraints imposed upon its possessors by the common or statute law of the state, or by the then existing statutes of the United States, so far as they were engaged in interstate commerce. If in any manner and to any extent whatever they have actually violated the latter, surely they could be restrained or otherwise made amenable to the legal penalties in such behalf without crippling or destroying a business in which they are profitably and usefully engaged.

"To these defendants, thus innocently and lawfully engaged in transporting coal which they own, or are interested in to

the extent and under the circumstances hereinbefore set forth, comes this act of Congress and declares that this whole business is unlawful, and that the future exercise of a vested right of ownership, which they have heretofore and for long periods of years enjoyed, under the belief that it was an ordinary right of property enjoyed innocently by all citizens of the state alike, and inviolable as such, is a crime, and punishable as such. That this legislation is drastic and harsh does not, of course, dispose of the question of power on the part of Congress to enact it. The first inquiry to be made, therefore, is as to whether this legislation is a regulation of commerce within the true meaning of the commerce clauses of the Constitution.

"We may assume, therefore, that the commerce clause of the Constitution is no exception to the general doctrine that unlimited power has no place in American governmental institutions, and that there are rights of liberty and property that are secure against hostile legislative action.

"In the opinion of this Court, the enactment in question is not a regulation of commerce, within the proper meaning of these words, as used in the commerce clause of the Constitution, and therefore not within the power granted by that clause.

"We confine ourselves to the concrete facts presented by the pleadings in these cases, and intimate no opinion either way as to cases where property has been acquired by the carriers subsequent to the passage of the act. For the reasons stated, therefore, these bills in equity are dismissed and the petitions for writs or mandamus on the law side of this court are denied."

Judge Dallas in his opinion says that he "fully concurs in the foregoing opinion, and the little now to be added is intended merely to accentuate my acceptance of it."

Continuing, he says:

"The prohibitory intent of the piece of legislation under consideration is too plain for disavowal, and the suggestion that what it prohibits is not interstate commerce, but interstate transportation by a railroad company of commodities which it has produced, etc., is delusive. The question is not whether the carriage from state to state of coal produced by the carrier is interstate commerce, for of course it is; but whether, being a kind of commerce which is not inimical to safety, health or morals, and which, therefore, any one is entitled to pursue "as of right," Congress may restrict a railroad company's interstate transportation to coal not mined or owned by it, and in which it has no interest. Any such restriction, whatever it may be called, in its nature and effect is discriminative prohibition; and that the restrictive provision now in question was enacted, not actually for the regulation of interstate commerce, but really to coerce the conformity of intrastate business with a 'policy' approved by Congress, seems practically to be admitted, and could not, with candor, be denied.

"No court has authority under the guise of interpretation to change the Constitution for the purpose of meeting a supposed requirement of present conditions, and the covert tendency of any usurpation of any such authority would inevitably be to transform the government of enumerated powers, which the Constitution established, into a government with all power vested in its legislative and executive branches.

"The inclination sometimes manifested to centralize power in the general government results in great measure, no doubt, from the apparent expediency of committing to it the correction of ills which it is supposed that the states cannot so readily redress; but the achievement of no presently desired end, however salutary, can justify the infraction of our fundamental law or warrant its perversion by insidious construction. The Constitution of the United States is a written instrument, not a progressive development, and the often quoted epigram that 'Constitutions are not made, but grow,' should not apply to it."

THE RELATION OF RAILROADS TO THE STATE.*

I propose to treat the subject in two aspects: first, the history in outline of the relations between railroads and the state in different countries; and second, the question of the factors which are of primary importance in any consideration of the matter.

Ever since the year 1830, when the dramatic success of the Liverpool & Manchester Railway first revealed to a generation less accustomed than our own to revolutionary advances in material efficiency the startling improvements in transport that railroads were about to effect, theorists have discussed the question whether state or private ownership of railroads be in the abstract the more desirable. But it is safe to say that in no country has the practical question, "Shall the state own or not own the railroads?" been decided on abstract considerations. The dominant considerations have always been the historical, political and economic position of the particular country at the time when the question came up in concrete shape for decision.

BELGIUM.

The Belgian railroads have belonged to the state from the outset, because they were constructed just after Belgium separated from Holland, and (the available private capital being in Holland and not in Belgium) King Leopold and his Ministers felt that, if the railroads were in private hands, that would mean in Dutch hands, and the newly acquired independence of Belgium would be thereby jeopardized. Within the last few years this history has repeated itself, and the fact that the bulk of the Swiss railroad capital was held in France and Germany was one main reason, if not the main reason, which induced the Swiss people to nationalize their railroads.

GERMANY.

In Germany 70 years ago the smaller states were regarded as the personal property of their respective Sovereigns, almost as definitely as Sutherlandshire is the property of the Duke of Sutherland. And it was therefore as natural that the Dukes of Oldenburg or Mecklenburg should make railroads for the development of their estates as that the Duke of Sutherland should build a railroad in Sutherland.

AUSTRALASIA.

Take, again, Australasia. In that region the whole of the railroads, with negligible exceptions, now belong to the different state governments, and the public sentiment that railroads ought to be public property is to-day so strong that it is impossible to imagine any serious development of private lines. But at the outset the traditional English preference for private enterprise was just as strong there as it was at home, and it was only the fact that the whole of the available private capital was absorbed in the development of the gold fields and that, therefore, if railroads were to be built at all, public credit must be pledged and English capital must be obtained, that caused the State to go into the railroad business.

ITALY.

Take, once more, the case of Italy. In the days when Italy was only a geographical expression, the various Italian states experimented with railroad management of all sorts and kinds. When, after 1870, Italy was unified, it was necessary to adopt a national railroad policy, and the Italian government instituted an inquiry whose exhaustiveness has not since been approached. The force of circumstances has indeed already compelled the Government to acquire the ownership of the railroads, but the Commission reported that it was not desirable that the government should work them. The railroads were accordingly leased for a period of 60 years, running from 1884, to three operating companies, and it was provided that the

*An address delivered at Dublin, September 2, by W. M. Acworth, M.A., President of the Section, before the Economic Science and Statistics Section of the British Association for the Advancement of Science.

leases might be broken at the end of the 20th or the 40th year. From the very outset a condition of things developed which had not been contemplated when the leases were granted, and for which the leases made no provision. Constant disputes took place between the government and their lessees. Capital for extensions and improvements was urgently needed; neither party was bound to find it; and agreement for finding it on terms mutually acceptable was impossible of attainment. In the end the government has been forced to cut the knot, to break the lease at the end of the first 20 years' period, and for the last two years the Italian government has operated its own railroads. But it is safe to say that an *a priori* preference for state management over private management played but scant part in the ultimate decision.

GENERAL INCREASE OF STATE CONTROL.

It is impossible to review, even in the merest outline, the railroad history of all the countries in the world, but the instances already given will serve to illustrate my proposition that the position in each country depends not on abstract considerations, but on the practical facts of the local situation. Yet one cannot look round the world and fail to recognize that the connection between the railroads and the state is everywhere becoming more intimate year by year. Whatever have been the causes, the fact remains that Italy and Switzerland have converted their railroads from private to public. In Germany the few remaining private lines are becoming still fewer. In Belgium the process is practically completed. In Austria it is moving steadily in the same direction: four-fifths of the total mileage is now operated by the state. In Russia the story would have been the same, had it not been for the war with Japan. Even in France, whose railroads have a very definite local and national history of their own, an Act for the purchase of the Western Railway by the state was passed last year by the Chamber of Deputies, and has now, after much contention, been passed by the Senate within the last few weeks. But it is not without interest to note that, though a majority both of deputies and of senators supported the bill, the representatives of the district served by the company were by a large majority opposed to it, while the commercial community of the whole of France, as represented by the Chambers of Commerce, were almost unanimously hostile.* So far as can be seen at present, the purchase of the Western Railway by the state is not likely to be made a precedent for the general nationalization of the French railroads. Still, the broad fact remains that a series of railroad maps of the continent of Europe, constructed at intervals of ten years, would undoubtedly show an ever-increasing proportion of state lines, and that the last of the series would exhibit the private lines as very far below the state lines both in extent and in volume of traffic.

A word ought to be said of Holland, not only because Holland is a country with free institutions like our own, but because the railroad position of Holland is unique. The railroads of that country were built partly by the state and partly by private enterprise, but the working has always been wholly in private hands. Some ten years ago, however, the Dutch government bought up the private lines and rearranged the whole system. The main lines of the country are now leased to two operating companies, so organized that each company has access to every important town, and railroad competition is now practically ubiquitous throughout Holland. So far there are no signs that the Dutch people are otherwise than satisfied with their system. Now compare this with France. The French government, though it has hitherto, except on the comparatively unimportant state railroads in the southwest of the country, stood aloof from the actual

operation, has always kept entire control of railroad construction and of the allocation of new lines between the several companies. And the French government has proceeded on a principle diametrically opposed to the Dutch principle. In France railroad competition has, as far as possible, been definitely excluded, and the various systems have been made to meet, not, as in Holland, at the great towns, but at the points where the competitive traffic was, as near as might be, a negligible quantity. Now that questions of competition and combination are to the fore in England, and seem likely to give very practical occupation to Parliament in the session of 1909, the precedents on both sides are perhaps not without interest.

AMERICA.

When we turn from the continent of Europe to the continent of America the position of affairs is startlingly dissimilar. The railroads of America far surpass in length those of the continent of Europe, while in capital expenditure they are equal. State-ownership and operation of railroads on the continent of America is as much the exception as it is the rule in Europe. In Canada there is one comparatively important state railroad, the Intercolonial, about 1,500 miles in length. Though its earnings are quite considerable—about 20% per mile per week—it barely pays working expenses. I may add that in all the voluminous literature of the subject I have never seen this line cited as an example of the benefits of state management. There is another small line, in Prince Edward Island, which is worked at a loss; and a third, the Temiskaming & Northern Ontario Railway, owned not by the Dominion but by the Provincial government, which is too new to afford any ground for conclusions.

The Federal government of the United States has never owned a railroad, though some of the individual states did own, and in some cases also work, railroads in very early days. They all burnt their fingers badly. But the story is so old a one that it would be unreasonable to found any argument on it to-day.

In Mexico, of which I shall have more to say directly, the state owns no railroads. As for Central America, Costa Rica and Honduras have some petty lines, which are worked at a loss. Guatemala had a railroad till 1904, when it was transferred to a private company. Nicaragua has also leased its lines. Colombia owns and works at a profit, all of which is said to be devoted to betterment, 24 miles of line.

In South America, Peru and Argentina own, as far as I am aware, no railroads. The Chilean government owns about 1,600 miles out of the 3,000 miles in the country. Needless to say private capital has secured the most profitable lines. The government railroad receipts hardly cover the working expenses. The Brazilian government formerly owned a considerable proportion of its railroad network of nearly 11,000 miles. Financial straits forced it some years ago to dispose of a large part to private companies, to the apparent advantage at once of the taxpayer, the shareholder and the railroad customer. About 1,800 miles of line are still operated by the government, the receipts of which, roughly speaking, do a little more than balance working expenses. But it may be broadly said that the present Brazilian policy is adverse to state ownership and in favor of the development of the railroad system by private enterprise.

THE UNITED STATES SITUATION.

The question of public ownership and operation was, however, raised very definitely in the United States only two years ago, when Mr. Bryan made a speech stating that his European experience had convinced him that it was desirable to nationalize the railroads of the United States. For many weeks after, Mr. Bryan's pronouncement was discussed in every newspaper and on every platform, from Maine to California. Practically, Mr. Bryan found no followers, and to-day, though he is the accepted candidate of the Democratic party for the Presidency, the subject has been tacitly shelved.

*Further, it is common knowledge that the Senate only passed the bill (and that by a majority of no more than three) because M. Clemenceau insisted that he would resign if it was not passed, and, though they disliked nationalization much, they disliked M. Clemenceau's resignation more.

To some extent this may have been due to the ludicrous impossibility, if I may say so with all respect for a possible President, of Mr. Bryan's proposals. In order, presumably, not to offend his own Democratic party, the traditional upholders of the rights of the several states, he seriously suggested that the Federal government should work the trunk lines, and the respective state governments the branches. Even if anybody knew in every case what is a trunk line and what is a branch, the result would be to create an organism about as useful for practical purposes as would be a human body in which the spinal cord was severed from the brain. Mr. Bryan's proposal was never discussed in detail: public sentiment throughout the Union was unexpectedly unanimous against it, and it is safe to say that the nationalization of the railroads of the United States is not in sight at present.

But though nationalization is nowhere in America a practical issue, everywhere in America the relations between the railroads and the state have become much closer within the last few years. Canada a few years ago consolidated its railroad laws and established a Railway Commission, to which was given very wide powers of control both over railroad construction and operation and over rates and fares for goods and passengers. Argentina has also moved in the same direction. In the United States, not only has there been the passage by the Federal Congress at Washington of the law amending the original Act to Regulate Commerce and giving much increased powers to the Interstate Commerce Commission, besides various other Acts dealing with subsidiary points, such as hours of railroad employees, but scores, if not hundreds, of Acts have been passed by the various state legislatures. With these it is quite impossible to deal in detail; many of them impose new pecuniary burdens upon the railroad companies, as, for instance, the obligation to carry passengers at the maximum rate of a penny per mile. All of them, speaking broadly, impose new obligations and new restrictions upon the railroad companies. Not a few have already been declared unconstitutional, and therefore invalid, by the law courts. And when the mills of American legal procedure shall at length have finished their exceedingly slow grinding, it is safe to prophesy that a good many more will have ceased to operate. But for all that, the net result of state and Federal legislation in the sessions of 1906 and 1907 will unquestionably be that even after the reaction and repeal, which, thanks to the Wall street panic of last year, is now in progress, the railroads of the United States will in the future be subject to much more rigid and detailed control by public authority than there has been in the past. The reign of railroad despotism, more or less benevolent, is definitely at an end; the reign of law has begun. It is only to be regretted that the quantity of the law errs as much on the side of excess as its quality on the side of deficiency.

THE MEXICAN SITUATION.

Apart from its interest as a quite startling example of how not to do it, the recent railroad legislation of the United States is only valuable as an indication of the tendency, universal in all countries, however governed, for the state to take a closer control over its railroads. Much more interesting as containing a definite political ideal, worked out in detail in a statesmanlike manner, is the recent railroad legislation of Mexico. One may be thought to be verging on paradox in suggesting that England, with seven centuries of parliamentary history, can learn something from the Republic of Mexico. But for all that I would say, with all seriousness, that I believe the relation between the state and the national railroads is one of the most difficult and important questions of modern politics, and that the one valuable and original contribution to the solution of that question which has been made in the present generation is due to the President of the Mexican Republic and his Finance Minister, Señor Limantour.

Broadly, the Mexican situation is this: The Mexican rail-

roads were in the hands of foreign capitalists, English mainly so far as the older lines were concerned, American in respect of the newer railroads, more especially those which constituted continuations southwards of the great American railroad systems. The foreign companies, whether English or American, naturally regarded Mexico as a field for earning dividends for their shareholders. The American companies further, equally naturally, tended to regard Mexico as an annexe and *dépendance* of the United States. If they thought at all of the interest of Mexico in developing as an independent self-contained state, they were bound to regard it with hostility rather than with favor, and such a point of view could hardly commend itself to the statesmen at the head of the Mexican government. Yet Mexico is a poor and undeveloped country, quite unable to dispense with foreign capital; and, further, it was at least questionable whether Mexican political virtue was sufficiently firm-rooted to withstand the manifold temptations inherent in the direct management of railroads under a parliamentary régime. Under these circumstances the Mexicans have adopted the following scheme: For a comparatively small expenditure in actual cash, coupled with a not very serious obligation to guarantee the interest on necessary bond issues, the Mexican government have acquired such a holding of deferred ordinary stock in the National Railroad Company of Mexico as gives them, not, indeed, any immediate dividend on their investment, but a present control in all essentials of the policy of the company, and also prospects of considerable profit when the country shall have further developed. The organization of the company as a private commercial undertaking subsists as before. A board of directors, elected in the ordinary manner by the votes of shareholders, remains as a barrier against political or local pressure in the direction of uncommercial concessions, whether of new lines or of extended facilities or reduced rates on the old lines; but—and here is the fundamental difference between the new system and the old—whereas under the old system the final appeal was to a body of shareholders with no interest beyond their own dividend, the majority shareholder is now the Government of Mexico, with every inducement to regard the interests, both present and prospective, of the country as a whole.

IRREFRAGABLE THEORY OF PUBLIC OWNERSHIP.

Public ownership of railroads is in theory irrefragable. Railroads are a public service; it is right that they should be operated by public servants in the public interest. Unfortunately, especially in democratically organized communities, the facts have not infrequently refused to fit the theories, and the public servants have allowed, or been constrained to allow, the railroads to be run, not in the permanent interest of the community as a whole, but in the temporary interest of that portion of the community which at the moment could exert the most strenuous pressure. The Mexican system, if it succeeds in establishing itself permanently—for as yet it is only on its trial—may perhaps have avoided both Scylla and Charybdis. Faced with a powerful but local and temporary demand, the government may be able to reply that this is a matter to be dealt with on commercial lines by the board of directors. If, on the other hand, permanent national interests are involved, the government can exercise its reserve power as a shareholder, can vote the directors out of office, and so prevent the continuance of a policy which would in its judgment be prejudicial to those interests, however much it might be to the advantage of the railroad as a mere commercial concern.

STATE CONTROL OR OWNERSHIP.

The history whose outline I have now very briefly sketched shows, I think, that whereas there is everywhere a tendency towards further state control, the tendency towards absolute state-ownership and state-operation is far from being equally universal. I shall have a word to say presently as to the reasons why America shows no signs of intention to follow

the example of continental Europe. Meanwhile it is well to notice that American experience proves also the extreme difficulty of finding satisfactory methods of control. Sir Henry Tyler said some five-and-thirty years ago in England, in words that have often been quoted since, "If the state can't control the railroads, the railroads will control the state"; and President Roosevelt has again and again in the last few years insisted on the same point. "The American people," he has said in effect, "must work out a satisfactory method of controlling these great organizations. If left uncontrolled, there will be such abuses and such consequent popular indignation that state-ownership will become inevitable, and state-ownership is alien to American ideas, and might cause very serious political dangers."

Perhaps some of my hearers may remember Macaulay's graphic description of the passion that was aroused by Charles James Fox's proposed India Bill; it was described as a Bill for giving in perpetuity to the Whigs, whether in or out of office, the whole patronage of the Indian government. The objection felt by American statesmen to handing over their railroads to the National government—for I think it may be taken for granted that if they were nationalized it would have to be wholly under federal management, and that the separate states could take no part in the matter—is in principle the same. There are something like a million and a half men employed on the railroads of the United States, say roughly 7 or 8 per cent. of the voters. Americans feel that rival political parties might bid against each other for the support of so vast and homogeneous a body of voters; that the amount of patronage placed at the disposal of the executive government for the time being would be enormous; and that the general interests of the nation might be sacrificed by politicians anxious to placate—to use their own term—particular local and sectional interests. How far this fear, which is undoubtedly very prevalent in the states, is justified by the history of state railroads in other countries is a question exceedingly difficult to answer. Dealing with state railroads in the lump, it is easy to point to some against which the charge would be conspicuously untrue. To take the most important state railroad organization in the world, the Prussian system, no one, I think, can fairly deny that it has been operated—in intention at least, if not always in result—for the greatest good of the greatest number. But then Prussia is Prussia, with a government in effect autocratic, with a civil service with strong *esprit de corps* and permeated with old traditions, leading them to regard themselves as the servants of the king rather than as candidates for popular favor. An American statesman, Charles Francis Adams, wrote as follows more than 30 years ago: "In applying results drawn from the experience of one country to problems which present themselves in another, the difference of social and political habit and education should ever be borne in mind. Because in the countries of continental Europe the state can and does hold close relations, amounting even to ownership, with the railroads, it does not follow that the same course could be successfully pursued in England or in America. The former nations are by political habit administrative, the latter are parliamentary. In other words, France and Germany are essentially executive in their governmental systems, while England and America are legislative. Now the executive may design, construct or operate a railroad; the legislative never can. A country therefore with a weak or unstable executive, or a crude and imperfect civil service, should accept with caution results achieved under a government of bureaus. Nevertheless, though conclusions cannot be adopted in the gross, there may be in them much good food for reflection."

CONTROL BY DEMOCRACY, OR OWNERSHIP BY AUTOCRACY.

I am inclined to think that the effect of the evidence is that the further a government departs from autocracy and develops in the direction of democracy, the less successful it

is likely to be in the direct management of railroads. Belgium is far from being a pure democracy; but compared with Prussia it is democratic, and compared with Prussia its railroad management is certainly inferior. Popular opinion in Belgium seems at present to be exceedingly hostile to the railroad administration; official documents assert that, while the service to the public is bad, the staff are scandalously underpaid, and yet that the railroads are actually not paying their way. There was, it is true, till recently an accumulated surplus of profits carried in the railroad accounts, but the official figures have been recently revised, and the surplus is shown to be non-existent.

The Swiss experiment is too new to justify any very positive conclusions being drawn from it; but this much is clear: the state has had to pay for the acquisition of the private lines sums very much larger than were put forward in the original estimate; the surplus profits that were counted on have not been obtained in practice; the economies that were expected to result from unification have not been realized; the expenditure for salaries and wages has increased very largely; and so far from there being a profit to the Federal government, the official statement of the railroad administration is that, unless the utmost care is exercised in the future, the railroad receipts will not cover the railroad expenditure.

The Italian experiment is still newer. It would not be fair to say that it proves anything against state management; but I do not think that the most fervid *Etatist* would claim that, either on the ground of efficiency or on the ground of economy, it has so far furnished any argument in favor of that policy.

If we wish to study the state management of railroads by pure democracies of Anglo-Saxon type, we must go to our own Colonies. My own impressions, formed after considerable study of the subject and having had the advantage of talking with not a few of the men who have made the history, I hesitate to give. It is easy to find partisan statements on both sides; for example, in a recent article in the *Nineteenth Century*, entitled "The Pure Politics Campaign in Canada," I find the following quotation from the *Montreal Gazette*—a paper of high standing—dated May 27, 1907: "Every job alleged against the Russian autocracy has been paralleled in kind in Canada. First, there is the awful example of the Intercolonial Railway, probably as to construction the most costly single-track system in North America, serving a good traffic-bearing country, with little or no competition during much of the year, and in connection with much of its length no competition at all, but so mishandled that one of its managers, giving up his job in disgust, said it was run like a comic opera. Some years it does not earn enough to pay the cost of operation and maintenance (I may interpolate that its gross earnings per mile are equal to those of an average United States railroad), and every year it needs a grant of one, two, three or four million dollars out of the Treasury to keep it in condition to do at a loss the business that comes to it. When land is to be bought for the road, somebody who knows what is intended obtains possession of it, and turns it over to the government at 40, 50 and 100 per cent. advance. This is established by the records of Parliament and of the courts of the land."

AFRICAN CAPE GOVERNMENT RAILROADS.

Probably no one outside the somewhat heated air of Canadian politics is likely to believe this damning accusation quite implicitly; but even if there were not a word of truth in it—and that the management of the Intercolonial Railway is, for whatever cause, bad, appears, I think, clearly from the public figures—it is bad enough that such charges should be publicly made and apparently believed. Let me quote now from a document of a very different type referring to a colony very far distant from Canada: "A Memorandum relative to Railroad Organization, prepared at the request of the Railroad Commissioners of the Cape Government Railways, by Sir Thomas R. Price, formerly general manager of those rail-

roads, and now general manager of the Central South African (i.e., Transvaal and Orange River) Railways, dated Johannesburg, February 22, 1907.

"The drawbacks in the management of the railroads in the Cape that call for removal arise from the extent to which, and the manner in which, the authority of Parliament is exercised. They are twofold in their character, viz.:

"(1) The practice of public authorities, influential persons, and others bent on securing concessions or other advantages which the general manager has either refused in the conscientious exercise of his functions, or is not likely to grant, making representation to the Commissioner (as the ministerial head of the Government), supplemented by such pressure, political influence, or other means as are considered perfectly legitimate in their way, and are best calculated to attain the end applicants have in view.

"(Many members of Parliament act similarly in the interests of the districts, constituents, or railroad employees in whom they happen to be interested. It is by no means unknown for the requests in both classes of cases to coincide somewhat with a critical division in Parliament—present or in prospect—or otherwise something has occurred which is regarded as irritating to the public or embarrassing to the Government, and the desire to minimize the effect by some conciliatory act is not unnatural.)

"(2) The extent to which the fictitious, and often transitory, importance which a community or district manages to acquire obscures (under the guise of the Colony's welfare) the consideration of the railroad and general interests of the Colony as a whole."

(During the earlier period of my railroad service in the Cape Colony few things impressed me more, coming as I had from a railroad conducted on strictly business lines, than the extent to which the conduct of railroad affairs was influenced by certain conditions. Nor was this impression lessened afterwards when, in the course of a conversation on the matter, Sir Charles Elliott mentioned to me that he had more than once told a late railway commissioner, "The Government is powerful, but [mentioning the town and authority] is more powerful still.")

"I do not regard it as open to doubt that the Colony as a whole has suffered severely in consequence, the inland portions of the Colony particularly so; and that the need for a remedy is pressing if the railroads are to be conducted as a business concern for the benefit of the Colony.

"The necessity for the railroads and their administration being removed from such an atmosphere, and treated as a most valuable means of benefiting the Colony as a whole, while not neglecting the interests of a district (but not subordinating the welfare of the whole Colony thereto), is pressing. That there should be an authority to refer to in case of real necessity, where the decision or action of the general manager is not regarded as being in the public interests, is also clear. But it is equally manifest that the Commissioner or the Government of the day, with political or party consideration always in view, is not the proper court of reference.

"There can be little doubt that in the Cape Colony political considerations have influenced the adoption of new lines and their construction—many, if not most of them, of an unprofitable character—without sufficient inquiry or information, often with scanty particulars, and possibly contrary to the advice of the officer afterwards entrusted with the construction and working of the line.

"A material change is imperatively necessary in this respect, if only to insure the solvency of the Colony."

VICTORIAN (AUSTRALIA) RAILROADS.

It is sometimes conceded that improper exercise of political influence may be a real danger where railroads are managed under a parliamentary régime by a Minister directly responsible to Parliament; but that difficulty, it is said, can be got over by the appointment of an independent Commission entirely outside the political arena. History does not altogether justify the contention. The last report of the Victorian State Railways gives a list of seven branches, with an aggregate length of 46 miles, constructed under the Commissioner régime at a cost of 387,000*l.*, which are now closed for traffic and abandoned because the gross receipts failed even to cover the out-of-pocket working expenses. It is not alleged, nor is it a fact, that those lines were constructed in consequence of any error of judgment on the part of the Commissioners. But in truth it is inherently impossible to use a Commission to protect a community against itself. In theory a Commission might be a despot perfectly benevolent and perfectly intelligent; in that case, however, it can hardly be said that the nation manages its own railroads. But of course any such idea is practically impossible, because despots, however benevolent and intelligent, cannot be made to fit into the framework of an Anglo-Saxon constitution. In practical life the Railway Commission must be responsible to some-

one, and that someone can only be a member of the political government of the day.

COMPETITION HAS CEASED TO REGULATE.

I have indicated what in America, where the subject is much more carefully considered than here, is regarded as a great obstacle to a state-railroad system; but I have pointed out also that it is quite possible that statesmen fully alive to the dangers may yet find themselves constrained to risk them unless some satisfactory method of controlling private railroad enterprise can be found. I do not think it can be considered that this has been done in England at the present time. In the main we have relied on the force of competition to secure for us reasonable service at not unreasonable rates; and as I still cherish a long-formed belief that English railroads are on the whole among the best, if not actually the best, in the world, I am far from saying that competition has not done its work well. But competition is an instrument that is at this moment breaking in our hands. Within quite a few years the South Eastern Railway was united with the Chatham; the Great Southern has obtained a monopoly over a large part of Ireland; in Scotland the Caledonian and the North British, the Highland and the Great North have in very great measure ceased to compete. If the present proposals for the working union of the Great Eastern, the Great Northern and the Great Central go through, competition in the East of England will be absolutely non-existent from the Channel to the Tweed. And one can hardly suppose that matters will stop there. In fact, since this address was in type a comprehensive scheme of arrangement for a long term of years between the London & North Western and the Midland has been announced. We must, I think, assume that competition, which has done good work for the public in its day, is practically ceasing to have any real operation in regulating English railroads.

HOW SHALL GOVERNMENT REGULATE?

For regulation, therefore, we must fall back on government; but how shall a government exercise its functions? Regulation may be legislative, judicial, executive, or, as usually happens in practice, a combination of all three. But we may notice that, as Mr. Adams points out, in Anglo-Saxon countries it is the Legislature and the Judicature that are predominant; whereas in a country like France, which though a democracy is bureaucratically organized, it is executive regulation that is most important. Now, the capacity of the Legislature to regulate is strictly limited; it can lay down general rules; it can, so to speak, provide a framework, but it cannot decide *ad hoc* how to fit into that framework the innumerable questions that come up for practical decision day by day.

The capacity of the law courts to regulate is even more strictly limited. For not only is it confined within the precise limits of the jurisdiction expressly conferred upon it by the Legislature, but further, by the necessity of the case, a court of law can only decide the particular case brought before it; a hundred other cases, equally important in principle, and perhaps more important in practice, may never be brought before it at all. Even if the court had decided all the principles, it has no machinery to secure their application to any other case than the one particular case on which judgment was given. There was a case decided 30 years ago by our Railroad Commission, the principle of which, had it been generally applied throughout the country, would have revolutionized the whole carrying business of Great Britain. It has not been so applied, to the great advantage, in my judgment, of English trade. Further, the great bulk of the cases which make up the practical work of a railroad: "What is a reasonable rate, having regard to all the circumstances, present and prospective, of the case? Would it be reasonable to run a new train or to take off an old one? Would it be reasonable to open a new station, to extend the area of free cartage, and the like?"—all these are questions of discretion,

of commercial instinct. They can only be answered with a "Probably on the whole," not with a categorical "Yes" or "No," and they are absolutely unsuitable for determination by the positive methods of the law court with its precisely defined issues, its sworn evidence, and its rigorous exclusion of what, while the lawyer describes it as irrelevant, is often precisely the class of consideration which would determine one way or other the decision of the practical man of business.

It seems to me, therefore, that both in England and in America we must expect to see in the near future a considerable development of executive government control over railroads.

This is not the place to discuss in detail the form that control should take, but one or two general observations seem worth making. The leading example of executive control is France; in that country the system is worked out with all the French neatness and all the French logic. But it is impossible to imagine the French principle being transplanted here. For one thing, the whole French railroad finance rests upon the guarantee of the government. The French government pays, or at least is liable to pay, the piper, and has therefore the right to call the tune. The English government has not paid, and does not propose to pay, and its claim to call the tune is therefore much less. Morally the French government has a right—so far at least as the railroad shareholders are concerned—to call on a French company to carry workmen at a loss; morally, in my judgment at least, the English government has no such right. But there is a further objection to the French system: the officers of the French companies have on their own responsibility to form their own decisions, and then the officers of the French government have, also on their own responsibility, to decide whether the decision of the company's officer shall be allowed to take effect or not. The company's officer has the most knowledge and the most interest in deciding rightly, but the government official has the supreme power. The system has worked—largely, I think, because the principal officers of the companies have been trained as government servants in one or other of the great Engineering Corps, des Mines or des Ponts et Chaussées. But it is vicious in principle, and in any case would not bear transplanting.

What we need is a system under which the responsibility rests, as at present, with a single man (let us call him the general manager), and he does what he on the whole decides to be best, subject however to this: that if he does what no reasonable man could do, or refuses to do what any reasonable man would do, there shall be a power behind to restrain, or, as the case may be, to compel him. And that power may, I think, safely be simply the Minister—let us call him the President of the Board of Trade. For, be it observed, the question for him is not the exceedingly difficult and complicated question, "What is best to be done?" but the quite simple question, "Is the decision come to which I am asked to reverse so obviously wrong that no reasonable man could honestly make it?"

And even this comparatively simple question the President would not be expected to decide unaided. He will need competent advisory bodies. Railroad history shows two such bodies that have been eminently successful—the Prussian State Railway Councils and the Massachusetts Railroad Commission. Wholly unlike in most respects, they are yet alike in this: their proceedings are public, their conclusions are published, and those conclusions have no mandatory force whatever. And it is to these causes that, in my judgment, their success, which is undeniable, is mainly due. Let me describe both bodies a little more at length.

There are in Prussia a number (about ten, I think) of District Railway Councils, and there is also one National Council; they consist of a certain number of representative traders, manufacturers, agriculturists, and the like, together with a certain number of government nominees; and the railroad of-

ficials concerned take part in their proceedings, but without votes. The Councils meet three or four times a year, their agenda paper is prepared and circulated in advance, and all proposed changes of general interest, whether in rates or in service, are brought before them, from the railroad side or the public side, as the case may be. The decision of the Council is then available for information of the Minister and his subordinates, but, as has been said, it binds nobody.

The Massachusetts Railroad Commission is a body of three persons, usually one lawyer, one engineer, and one man of business, appointed for a term of years by the Governor of the state. Originally the powers of this Commission were confined to the expression of opinion. If a trade, or a locality, or indeed a single individual, thought he was being treated badly by a Massachusetts railroad, he could complain to the Commission; his complaint was heard in public; the answer of the railroad company was made there and then; and thereupon the Commissioners expressed their reasoned opinion. The system has existed now for more than 30 years, and it is safe to say that, with negligible exceptions, if the Commission expresses the opinion that the railroad is in the right, the applicant accepts it; if the Commission says that the applicant has a real grievance, the railroad promptly redresses it on the lines which the Commissioners' opinion has indicated. The success of the Commission in gaining the confidence of both sides has been so great that of late years its powers have been extended, and it has been given, for example, authority to control the issue of new capital and the construction of new lines. But on the question with which we are specially concerned here, the conduct of existing railroad companies as public servants, it can still do nothing but express an opinion; and it may be added that the Commission itself has more than once objected to any extension of that power.

Mr. Adams, from whom I have already quoted, was the first Chairman of the Commission. He has described their position as resting "on the one great social feature which distinguishes modern civilization from any other of which we have a record, the eventual supremacy of an enlightened public opinion." That public opinion is supreme in this country, few would be found to deny; that public opinion in railroad matters is enlightened, few would care to assert. But given the enlightened public opinion, one can hardly doubt that it will secure not merely eventual but immediate supremacy. In truth, as Bagehot once pointed out, a great company is of necessity timorous in confronting public opinion. It is so large that it must have many enemies, and its business is so extended that it offers innumerable marks to shoot at. It is much more likely to make, for the sake of peace, concessions that ought not to be made than it is to resist a demand that reasonable men with no personal interest in the matter publicly declare to be such as ought rightly to be conceded.

To sum up in a sentence the lesson which I think the history we have been considering conveys, it is this: Closer connection than has hitherto existed between the state and its railroads has got to come, both in this country and in the United States. Hitherto in Anglo-Saxon democracies neither state ownership nor state control has been over-successful. The best success has been obtained by relying for control, not on the constable, but on the eventual supremacy of an enlightened public opinion. Nearly 20 years ago, in the pages of the *Economic Journal*, I appealed to English economists to give us a serious study of what the Americans call the transportation problem in its broad economic and political aspects. Since then half-a-dozen partisan works have appeared on the subject, not one of them, in my judgment, worth the paper on which it is printed; but not a single serious work by a trained economist. And yet such a work is to-day needed more than ever. Let me once more appeal to some of our younger men to come forward, stop the gap, and enlighten public opinion.

STEAM MOTOR CAR FOR THE ROCK ISLAND.

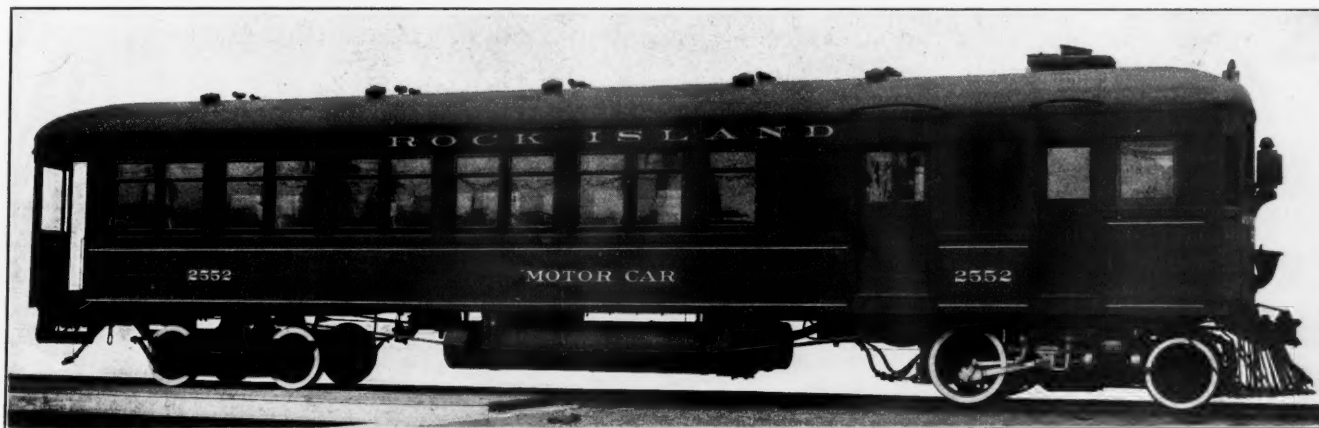
The Schenectady Works of the American Locomotive Company have recently completed a 250-h.p. compound steam motor car for the Chicago, Rock Island & Pacific, the general appearance of which is shown in the accompanying illustrations. The car body is of steel construction throughout with the exception of the interior finish and is divided into three compartments: an engine room, baggage room and passenger compartment, having a seating capacity for 40 passengers. This last compartment also includes toilet facilities. The car is 55 ft. 9 in. long over platform, and weighs in working order 100,000 lbs. Of this weight 33,300 lbs. is carried on the trailing truck and 61,700 lbs. on the motor truck, of which 32,400 lbs. is on driving wheels. On test runs made on the experimental tracks of the New York Central Railroad, the car has shown its capability for high speed, on several of the runs, speeds of 60 miles per hour having been attained.

In the design of the car body which was built by the American Car & Foundry Company, the aim was to make it as light as possible consistent with great strength. With this object in view, therefore, the truss rod construction was employed instead of following the more usual practice in the construction of steel cars of making the side frames below the window plates in the form of a girder or truss of sufficient strength to carry the whole weight of the car. The side posts are rolled

The floors of the passenger and baggage compartments consist of two layers of wood, the upper layer being laid diagonally across the car, while the floor of the engine room is of steel with wood covering; the section ahead of the engine between the center sills being, as before mentioned, removable. The inside sheathing of the passenger and baggage compartments is of mahogany and the head lining is fireproofed board. Light is provided by five pairs of oil lamps hung from the center of the car, there being four pairs in the passenger compartment and one in the baggage room.

The car is equipped with spring buffer and M. C. B. single spring draft rigging, and Major passenger coupler at the trailer end, and tender coupler at the motor end.

In the design of the boiler the problem of providing the required amount of heating surface within the necessarily limited space available has been very satisfactorily solved. The boiler is of the horizontal return tube type. The firebox and smokebox are at the front end and the gases of combustion pass through the fire-tubes to an intermediate smokebox chamber at the back end, and thence forward through the return tubes to the smokebox. The barrel of the boiler, which is in one sheet 61½ in. long, measures 49 in. diam. inside at the firebox end and 44 in. diam. inside at the intermediate smokebox end. It contains 214 fire-tubes 1¼ in. diam. and 3 ft. 9 in. long and an equal number of return tubes of the same diameter, but 3 ft. 11½ in. long. The total heating surface of



Steam Motor Car; Chicago, Rock Island & Pacific.

steel angles riveted at the bottom to the side sills, and at the top to the side plate angles which extend in one continuous piece the entire length of the car, on each side, and are bent at the ends to the shape of the end of the car. The carlines are steel channels bent to conform to the contour of the roof which is of the round type.

The side sills consist of 6-in. x 4-in. x ½-in. steel angles reinforced by 1-1½-in. truss rods, and the center sills are 8-in. I-beams. For a distance of 20 ft. back from the front end the side sills are reinforced by 6-in. x 4-in. x ½-in. angles riveted to the sills in such a manner that the horizontal leg is uppermost, furnishing a bearing surface for the floor of the engine room. The end sills are 8-in. steel channels securely fastened to the side sills by means of wrought iron corner plates and to the center sills by angle connections. A number of steel angles, fastened to the side sills and center sills by angle connections, tie the center and side sills together between the bolsters. These cross braces also serve as supports for the floor.

The bolster at the trailer end of the car is of the built-up type, while that at the motor end is of cast steel, made in three sections so that the middle section may be readily removed to permit the boiler and engine to be drawn out from the end of the car. The middle section of the front end framing of the car body and the flooring ahead of the engine are also made removable for this same purpose.

the boiler is 624.4 sq. ft., which gives 2.5 sq. ft. per horsepower. Of this heating surface, 527.8 sq. ft. is in the tubes and 37.6 sq. ft. in the firebox and the remainder in the superheater.

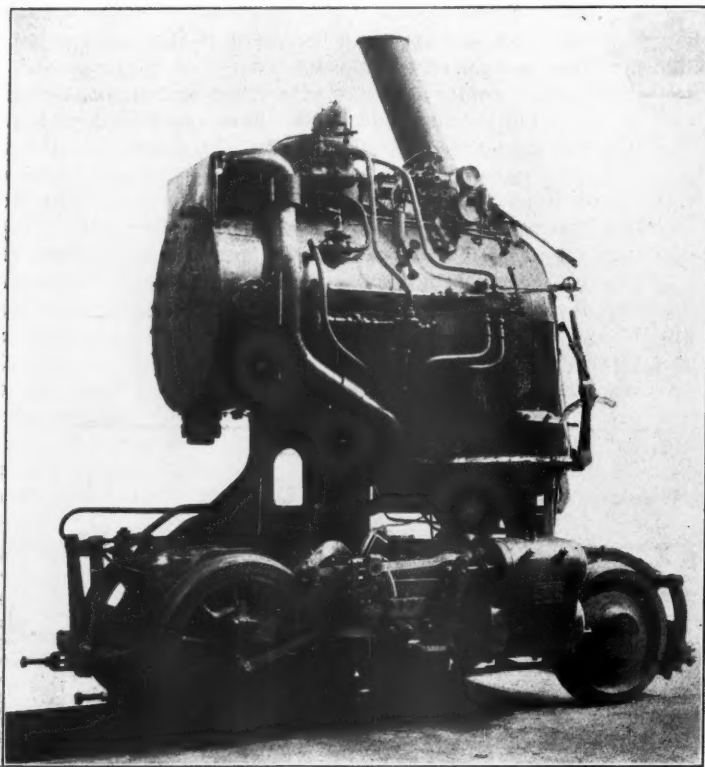
The firebox is 33½ in. long and 43¼ in. wide and is bricked for burning oil. The oil burner, which is located in the fire-door, is of special design and is provided with a fan-shaped deflector which deflects the oil downward toward the hot firebricks and also spreads it out over the firebox, thereby tending to produce perfect combustion.

The superheater is of the smokebox type and is located in the intermediate smokebox chamber where the temperature of the gases is high. The superheater tee head is bolted to a cast steel box saddle casting which, in turn, is bolted to the top of the boiler and covers the opening cut in the sheet through which the superheater tubes extend down into the smokebox chamber. The tee head is divided transversely into a front and a rear compartment by means of a vertical partition. There are 16 superheater tubes bent into the shape of a double loop, one end of each loop being connected with the front or saturated steam compartment, and the other end with the rear or superheated steam compartment. Steam flows from the dome through a short dry pipe into the saturated steam compartment; and thence through the superheater loops into the superheated steam compartment, and from thence into the steam pipe to the high-pressure steam chest.

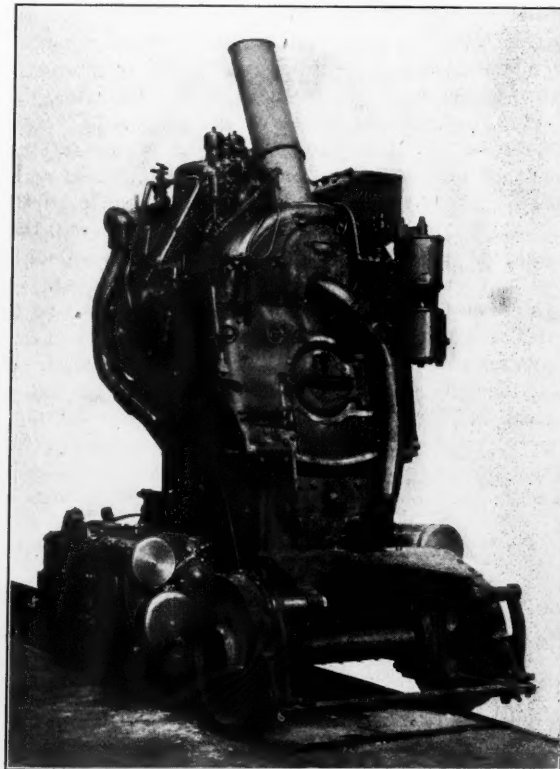
The boiler is rigidly connected to the motor truck frames, so as to eliminate the necessity of flexible steam joints.

The engine is of the two-cylinder cross compound type, the high-pressure cylinder being $9\frac{1}{4}$ in. in diameter with a 12-in. stroke, and the low-pressure cylinder, $14\frac{1}{2}$ in. in diameter, having the same stroke. The Mellin system of compounding

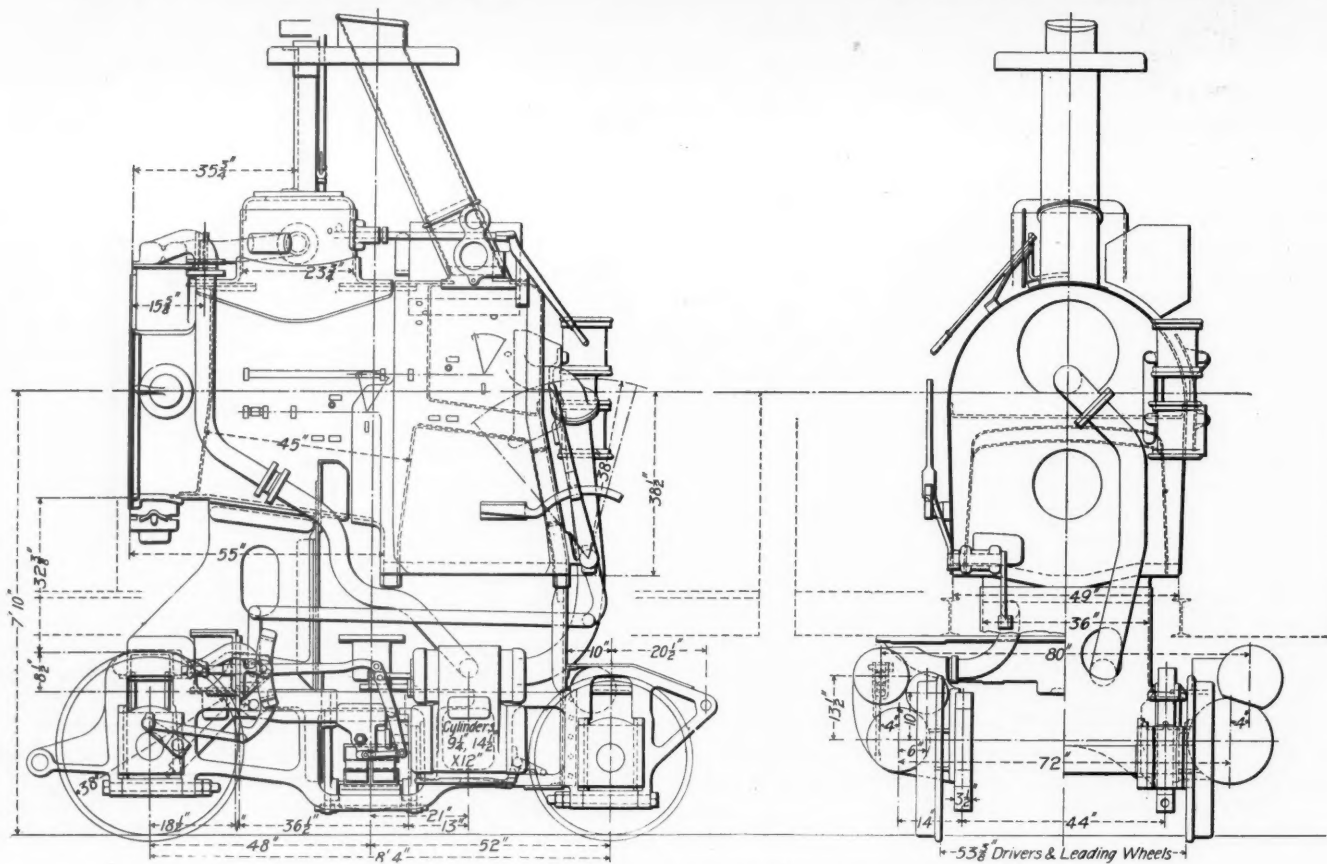
is used, the intercepting valve being located in the high-pressure cylinder casting. Both cylinders are equipped with piston valves actuated by the Walschaerts valve gear. The cylinders are in separate castings and are rigidly bolted to the side frames of the motor trucks. They drive on the rear wheels only of the truck, which are 38 in. in diameter. With a boiler



Side View of Engine.



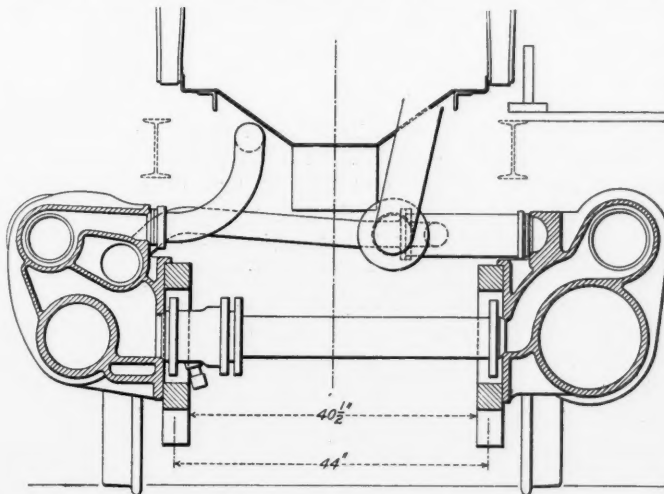
Front View of Engine.



Elevations of Engine; Rock Island Steam Motor Car.

pressure of 250 lbs. the engine will develop a theoretical maximum tractive effort, working compound, of 4,300 lbs.

The motor truck is of the four-wheel swinging bolster type. The side frames, which are of cast steel, are $3\frac{1}{2}$ in. wide, and are rigidly tied together by the cast steel transoms and by cross-ties suitably placed. The bolster is carried on double elliptic springs. The weight on the rear or driving journals is carried by a semi-elliptic spring, suspended between two cross equalizers whose ends rest on top of the journal boxes;



Sectional Elevation Through Cylinders.
Showing steam pipes and passages.

while the weight on the forward journals is carried by coil springs, one on top of each journal, thus giving a three point suspended truck.

The trailer truck is of the four-wheel, two-bar equalizer type; with solid wrought iron top frame, swinging bolsters of the built-up type, channel iron transoms and cast steel transom gussets. The wheels are 34 in. in diameter and the journals are $4\frac{1}{4}$ by 8 in.

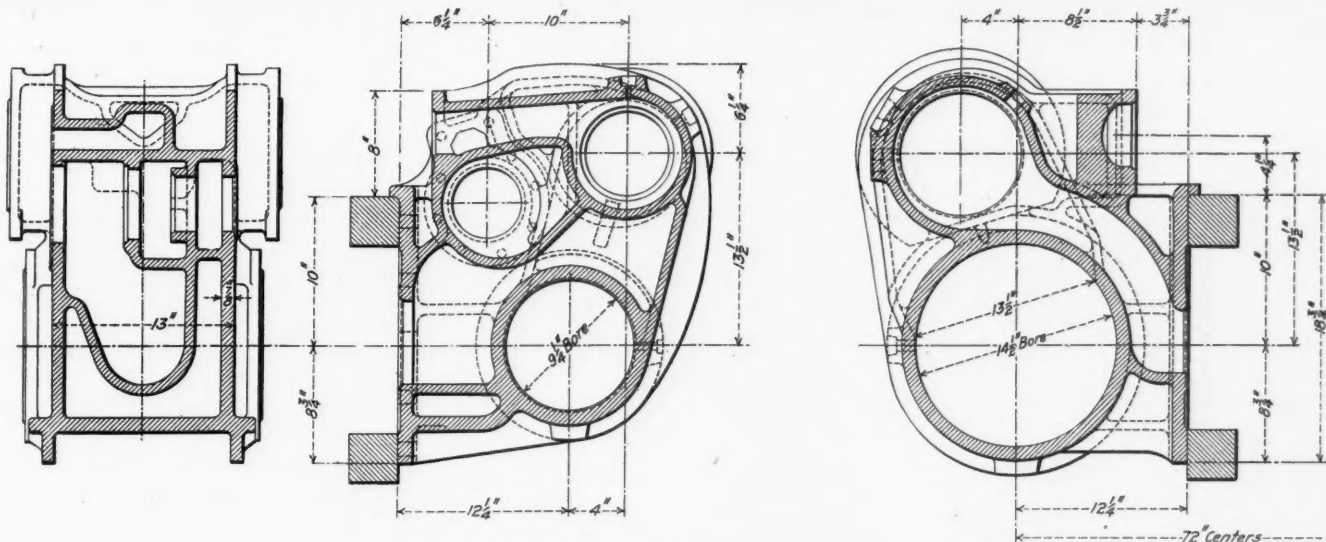
Both motor and trailer trucks are equipped with New York Air-Brake Co.'s air-brakes operated by an 8-in. Westinghouse

made, is of a type different from that used in railroad service. In the earlier steam motor cars built by this company an attempt was made to use existing types, either of the vertical or regular locomotive form. The former were found to be deficient in steaming capacity and the latter required more room than was available in a motor car. The result was a limited application. Further, in the earlier cars repairs were very difficult to make because of the inaccessibility of the parts and the fact that the car body was practically integral with the engine, though the latter was carried on an independent frame. Then there was the incumbrance of the coal bin and the necessity for carrying a fireman or overtaxing the capability of the driver.

All of these difficulties have been overcome in the present construction by building an engine which with its boiler is independent of the car and can be taken in and out at the front with a minimum of trouble. The compactness of the boiler has necessitated the removal of steam pipes from the smokebox and all piping is upon the outside, almost completely covering the shell, as shown by the special reproductions of the photographs of the engine itself.

The use of the cross-compound is also unusual in this class of motor, but in this instance results in an arrangement of steam and exhaust piping that is really less complicated than that of a simple engine would have been. This arrangement of piping is best shown in the general plan. The steam is carried down on the outside of the boiler to the high-pressure steam chest, whence it is exhausted to the intercepting valve and passes thence to the receiver and low-pressure cylinder. The low-pressure exhaust comes out through the front and goes into the smokebox above the fire-door and finally leaves by an inclined stack.

The location of the intercepting valve in the casting of the high-pressure cylinder was necessitated in this case by the absolute impossibility of putting it anywhere else. The usual construction of the two-cylinder cross-compound locomotive places the intercepting valve near the low-pressure cylinder. With this, the receiver is between the high-pressure cylinder and the intercepting valve, and the opening of the latter and the automatic change from simple to compound action is de-



High and Low Pressure Cylinders.

pump. New York air signal equipment and Gold steam heating equipment is also provided.

The oil for fuel is carried in a tank located in the engine room and having a capacity of 100 gallons. The water supply is carried in three tanks, suspended beneath the car midway between the trucks, having a total capacity of 1,000 gallons.

The details of the construction of the car, as shown in the drawings, possess a number of features of interest. In the first place the boiler, to which reference has already been

laid until the receiver pressure has been raised to that existing in the low-pressure steam chest due to the direct admission of live steam. With the arrangement used in this engine, the change takes place almost instantly with the first opening of the high-pressure exhaust, unless the emergency exhaust valve is opened. The disadvantage, however, in this particular instance, is not very great as the adhesive factor is very high, being 7.53, and slipping is very infrequent. While running compound it makes no difference where the valve is

located, the only difference being that, in automatic starting, it goes somewhat earlier into compound, as has already been stated. But, if a greater starting power is needed, the engine may be held in simple gear, by opening the emergency exhaust, up to eight or ten miles an hour when desired, without much danger of slipping for the aforesaid reason; namely, excessive adhesive weight. So that under these conditions it is a matter of no importance as to whether the intercepting valve is placed closer to one cylinder than to the other, and the only practicable location in this case is on the high-pressure side of the engine.

The ratio of the high to the low-pressure cylinders is 1 to 2.54, which is higher than that originally employed, but not as high as some that have been used.

The principal dimensions of the car are as follows:

Total weight	100,000 lbs.
Weight on leading truck	61,700 "
" " drivers	32,400 "
" " leading wheels	29,300 "
" " rear truck	38,300 "
Total wheel base	45 ft. 10 in.
Distance between truck centres	38 " 3 "
Wheel base of driving truck	8 " 4 "
Length of car body over sheathing	52 ft.
Length of car body over platform	55 ft. 9 in.
Diameter of cylinders	H. p., 9 1/4 in.; L. p., 14 1/2 in.
Stroke	12 "
Valves	Piston
Valve gear	Walschaerts
Wheels, driving, number	2
" " diameter	38 in.
" " leading, diameter	33 "
" " rear truck, diameter	34 "
" " journals, driving	6 x 12 "
" " journals, trailing truck	4 1/4 x 8 "
Boller, type	Horizontal return tubular
" working pressure	250 lbs.
" outside diam., intermediate smokebox end	44 in.
" firebox, length	33 1/2 "
" firebox, width	43 1/4 "
" tubes, diameter	1 1/4 "
" tubes, number and length	(214) 3 ft. 9 in.
Heating surface, tubes	(214) 3 ft. 11 1/2 in.
" " firebox	527.8 sq. ft.
" " superheater	57.6 "
" " total	59.0 "
	624.4 "

SYSTEM IN HANDLING MATERIAL.

BY N. M. RICE.

General Storekeeper A., T. & S. F.

The prime duty of a storekeeper may be defined as that of preserving an economical relation of stock on hand to issues. To carry out this duty effectively a standard method of handling all material and supplies must be elaborated. A system to be efficient must have constant reference to securing an economical ratio of stock to issues and must continually tend toward the maintenance of standards and standard practices.

A standard method of handling material stocks falls conveniently into a number of sub-divisions, which, after naming, we shall treat in some detail.

Standards.

1. Articles and classes of material.
2. Arrangement of stocks.
3. Facilities for handling.
4. Uniform method of requisitioning and delivery.
5. Daily accounting and records.
6. Units of consumption of various material items, such as of fuel per ton-mile on each division and for each class of engines and train.
7. Measure of storekeeping efficiency.
8. Book of rules.

The first sub-division under standard methods of handling material stocks to be considered, is standard articles and classification.

Many of these standards are set by the engineering, mechanical, operating and other departments. On the other hand there is a constant tendency on the part of those using material and supplies, or in charge of ordering same on store, to specify articles not standard. It is the storekeeper's duty to check this tendency and establish standards where they are not already prescribed for him. It is also his duty continually to call attention to standards that work against economy in the use of materials. The storekeeper knows, for instance, how many brake shoes are being used, and their

value. The superintendent of motive power or the general manager does not know, unless he asks for the information. In regard to important items the storekeeper should give the information without waiting to be asked. Some one may ask, "Of what use are standards?" "Do they not stand in the way of progress in adopting the best to-day?" When one particular article is found to be more serviceable than others, it should be made standard, in order that the entire railroad will reap the benefit from the use of this article. When a still better article or design is found and sufficiently proved, the standard should be changed. In establishing a new standard it should always be specified whether the obsolete stock is to be used or whether it is the intention to immediately replace all existing articles of the kind with the new. The latter procedure should be followed only in case of some dangerously defective article. Standards, when established, considerably reduce the cost and amount of stocks to be maintained and greatly simplify the science of storekeeping.

Not only must we have standard articles; the classification of our material should also be standard.

STANDARD ARRANGEMENT OF STOCK.

This standard arrangement of stock comprises a number of sections; the arrangement of the material within each section; the method of storing, and the relation of the sections to each other in the general layout, being uniform in all storehouses, irrespective of size.

The advantages of this system are numerous and evident, and include:

- Quick and complete supervision.
- Economy in handling and care.
- Uniform make-up of material reports and requisitions, day by day and monthly.
- Monthly and yearly inventory feasible without special expense and effort.
- Ease with which men transferred from one storehouse, or division, to another may acquaint themselves with the stock.
- Rapidity of inspection by general officers or staff.

The arrangement of locomotive castings should be the same for finished as for rough, and should be in sections according to engine class, each section having the individual parts in the same respective location. The arrangement primarily by class of engines, rather than by the kind or part, facilitates the movement of material when engines are transferred from one division to another, as well as the maintenance of stock for engines due for shop.

HANDLING MATERIAL.

One of the prime requisites in an efficient system of stock arrangement is facility of handling. This applies equally to shelf-hardware located within doors—and as to finished castings and products on platforms—also to scrap. It would require going beyond the limits of this paper to attempt to describe such arrangements in detail. I may, however, mention the importance of training the men at the general storehouse in the practice of loading consignments of material for outlying storehouses in station order, both as to distance and as to side of track, thus assisting the trainmen in promptly locating the material at stations and avoiding possibility of surpluses and shortages.

REQUISITIONS.

Requisitions should be monthly, and, as will be pointed out, they can be compiled more conveniently and intelligently from the stock book. A monthly requisition means a thirty-day delivery, keeping the stock down to the sixty-day limit. In making requisitions from the stock book the division storekeeper is governed not only by the amount on hand, but by the amount still due, and he must order with close observation of past issues, so as not to get too great a stock on hand.

The monthly requisition should be in triplicate, one copy to be retained for file, original and duplicate sent to general storekeeper, original should be kept in his file as authority for the shipment, the duplicate being priced, extended and returned as an invoice, covering items shipped, thus avoiding error,

the work of writing a separate invoice and the trouble of comparing same.

RECORDS AND ACCOUNTS.

By far the most important records to be kept are the stock books or running inventory of receipts and stock on hand. These books are, of course, like all forms used in systematic

With the monthly accounting it is necessary to wait until the month's business is complete before we can think of rendering our distribution. With the daily record these reports are available for information as to running expenses and amount of issues when called for. In fact, they enable a halt to be called at any time on the excessive use of any

class of material, which is very essential at these times when it is necessary to conserve the resources and expenditures of the company to the utmost.

From the daily distribution the monthly summary or consolidation is easily made, by accounts, their sub-divisions and costs.

From the division stock bonds, kept daily as to receipts of material and checked frequently as to stock on hand, a consolidation is made in the general storekeeper's office monthly, showing the amount on hand of each item, at each storehouse on the entire line. All points are shown in parallel columns upon a single page, a line being given to each.

This consolidated stock book is of great value and usefulness; it indicates at all times an inventory of the amount of supplies on hand, where located, danger of shortage, or a surplus. Should a shortage occur it can be immediately relieved

by transfer from a neighboring storehouse. By means of such a record the stock may be contracted or expanded at will to accord with the business and financial requirements of the company. A 90-day stock of an item at one place may



Division Store at Newton, Kan.; Atchison, Topeka & Santa Fe.

railroad accounting, standard in makeup, and entries correspond with the arrangement of material in the storehouse. This plan facilitates checking the stock on hand; it also shows issues in the past by months, giving a key for ready reference in the makeup of monthly requisitions, as the columns are ruled for each month of the year.

Great improvement has been made in recent years in store accounting, due to new and simplified forms, so that in spite of the enormous increase in business the work is carried on efficiently with practically the same office force as was maintained under the old non-uniform method.

The stock book is the key to the system. The keynote of that system is daily accounting—the keeping of the records up to now. Many records lose much of their value because they reflect conditions too old to be of present use, too far past to modify. Daily accounting is just as cheap as monthly accounting—the entries have to be made sometime—and it is of far more immediate use and value. In the end it is cheaper as back references may be made more readily.

Among the important daily accounts to be kept are:

Issues of materials and supplies to the prescribed accounts and to their subdivisions (such as to individual engines, stock or shop orders, construction authorities, etc.).

Issues of fuel to each locomotive and man, on basis of tons hauled and miles run.

Pay roll of employees, so as to keep constant check on the expense of handling.



General Stores at Topeka; Atchison, Topeka & Santa Fe.

be balanced against a 30-day stock at another. Indeed, while the standard stock requirements (taken in conjunction with the issues) are apparent at all times, these standards themselves may be reduced or increased from, say, 60 days to 45 or even 30 days, when stringent balancing of expenditures

with revenues is necessary; or to 90 days or even six months when traffic is congested and economy of car movement is chiefly desired.

Such a record places before one at all times a comparison of issues with purchases, so that they may be kept equal, month by month and year by year, not only as to gross costs involved, but as to quantity in each class of material, as to weight of iron castings and brass castings received and issued, and as to scrap returned. This policy keeps the standard stock ratio constant, furnishing a check as between invoices of new material against daily records of issues.

STANDARDS OF CONSUMPTION.

Most of the important railroads in this country have awakened to the fact that where a distinct store department is in charge of all material, a larger per cent. of issues to stock on hand can be shown, and a reduction can be effected in the amount of material used.

It is not so clearly realized by railroad managements that a greater economy and efficiency of operation will be attained by making the officer in charge of stores and supplies the custodian of all material on the railroad excepting real estate, right-of-way and permanent buildings. This will require the storekeeper to keep a record of all renewable material elements of the railroad. By having possession of such a record he can form an intelligent idea of the ratio that renewals bear to the total of each kind of structure or equipment on a railroad, and the service to which each is subjected.

In the direction of systematic economies the storekeeper can be of the utmost value to his company by providing the measure for actual, and in the aggregate, great economy in the use of material, through comparative records as to rival designs of commodities, as well as to rival performances of divisions, or engines, or men, pointing the means by adopting the best in kind and method.

Separating the inventory of the physical property of a railroad into the sub-divisions of way, equipment and transportation, we find as important items of such record in relation to their renewals, the following:

Bridges (type and size)	Way.	Fish plates
Ballast		Spikes
Ties		Frogs
Rail		Switch stands
Boilers	Equipment.	Air pumps
Fireboxes		Freight car roofs and sidings
Wheels		Springs
Axles		Brake-shoes
Cylinders	Transportation.	
Fuel		Locomotive and train supplies
Oil		Station supplies

It should be the storekeeper's business to furnish records of consumption of important renewable material elements of the railroad to the officers responsible for operation and maintenance, without waiting to be called upon. He should do this without solicitation, as he has at hand the record of all material and supplies used from day to day. Thus being the official observer of the barometer of the operating condition, he should publish his observations to those whose interests and work are affected by variation in these conditions, just as the reports of the weather observer assist all occupations affected by weather conditions.

From a complete inventory as to every tie in service, the wood, and the treatment, giving the longest life and the least trouble from spiking may be determined. From records of spikes, the design requiring the least renewals and working the least injury to the tie may be readily seen. From records of fire boxes, the designs and character of sheets giving longest life and best service per unit of first cost and of repairs may be made known. From the fuel records, the value of different qualities of coal, or of coal compared with fuel oil, are known, and a measure of performance as to tonnage and mileage is at hand, as between various classes of engines and engine crews.

The success of any business, or of any system as applied to a business, rests chiefly upon the capacity of the man in

charge. This is particularly true of the railroad general storekeeper of to-day, as he depends upon system to acquaint him with the condition of affairs. His system should be such that the best results can be attained from ordinary men. But it is his peculiar office to select, adopt and evolve new and variant methods connected with the system, so as to always bring quick and dependable results. To make a good executive in this position, a general storekeeper must be a thorough judge of the men under him, not only as to present capabilities but as to future promotions and capacity of responsibility. He must be ever in touch with his superior officer, both as to requirements in the present and as to future conditions. Many qualities are needed to make a first-class general storekeeper. Almost any man has one or more of these qualities; but few possess a sufficiency of them to insure success; and it is the rarest man indeed that has all the qualifications. A first-class general storekeeper should be, above all, a diplomat. He must have a personality that he can deal with all classes of men, from the laborer handling scrap to the highest officer of the railroad. In dealing with men of equal or superior rank he must be able to secure co-operation, and get results through request rather than by command. Yet he must be fearless in the prosecution of his duty as "company watchdog." Perhaps we can best sum up the requirements of a first-class general storekeeper by saying that he must handle the company's property as if he were handling his own.

STANDARD BOOK OF RULES.

Security of life, and in fact, ability to carry on a railroad transportation business at all, requires certain rules to which all must adhere. These are incorporated in a book of operating rules. For the efficient conduct of a well-developed storekeeping system definite rules of procedure and practice are needed equally, and a standard book of such rules, in loose leaf form, covering all kinds of permanent instructions, with amendments and additions as growth and variety of business demands, should be a part of the equipment. These rules make not only the path of the employee clear but they save much correspondence and misunderstanding, as reference to a rule number will answer the question and cover cases which at first sight might seem to be special or unusual.

With such a book to guide him, and a practical study of his stock and local conditions, almost any man with good common sense and intelligence should make a good storekeeper or assistant. This facilitates the selection and training of men and familiarizes them with the principles of first-class organization.

What has been outlined appears to me to represent the essentials of a system as applied to the economical and efficient handling and use of materials on a railroad. Without system, wastes, misuse and surplus investment in material of all kinds are apt to become serious.

FOREIGN RAILROAD NOTES.

The exportation of rails from Germany during the five months ending with May were 247,157 tons this year, against 158,674 last year, and 186,474 in 1903. Meanwhile Great Britain exported 177,617 tons this year, against 162,621 last year.

Experiments have been made in transporting sea fish alive from Cuxhaven, at the mouth of the Elbe, to the interior of Germany. The fish were placed in tanks of sea water and also of artificially salted water, and survived, with comparatively few exceptions, for 72 hours.

The Shantung Railroad (German), 271 miles long, carried 5¼ per cent. more passengers and 7½ per cent. more freight in 1907 than in 1906. The gross earnings increased 8¼ per cent., and were \$4,350 per mile. The working expenses were only 34½ per cent. of the earnings, and the net earnings were \$2,827 per mile. A dividend of 4¼ per cent. was paid.

IMPORTANT NORWEGIAN RAILROAD.

Exploration work was commenced early in the seventies, and on March 1, 1894, it was decided to build the Bergen Railway. To-day the railroad between Bergen, Norway, and Christiania is nearly completed, a part of the eastern link only being unfinished. Bergen is the second largest town in Norway, and it has been hitherto separated from Christiania by a steamer journey of 60 hours. After this transmountain railroad has made connection with the Northern Railway about two years hence, the two cities will be but twelve hours apart.

The new railroad, which passes for 35 miles through regions of almost permanent snow and ice and reaches an altitude of 4,265 ft. above the sea level, will no doubt for a long time to come hold the record of the railroad construction of the world, as far as engineering and traffic difficulties are concerned; the Gravehals tunnel, a triumph of engineering skill, was cut through in nine years. This railroad, which is expected to show a surplus in its operation after a year or two, will be one of the principal tourist attractions of Norway, and will completely change the traveling route which is now in many cases more or less unhealthy.

OXY-ACETYLENE WELDING AND CUTTING TOOL.

The principle underlying the use of an oxy-acetylene flame for welding and cutting metals is that by concentrating within a very small area temperatures as high as 6,300 deg. Fahr., it is easily possible to reduce very quickly a small portion of any metal to a molten state. In welding, the union is made by a simple flowing together of the two metals, there being no necessity for compression or the use of fluxes. The wide application of such a process at once suggests itself to anyone familiar with the process of welding as commonly done—by heating the metals in furnaces and uniting them by compression, the result of a series of hammer blows. If it is possible to confine the heating and flowing of the particles of the metal within a small area and at the same time to generate sufficient heat to render compression unnecessary,

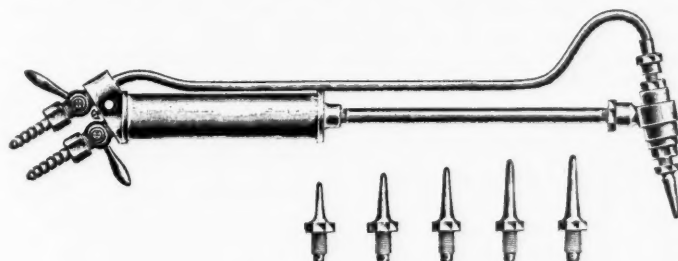


Fig. 1—Welding Tool.

the welding of metals at once becomes a much simpler process. The development in welding by this oxy-acetylene process has thus far been confined mostly to metals three-quarters of an inch thick and less, and especially in connection with boiler plates, although pieces of cast iron 14 in. thick have been welded together, by bevelling the edges and by filling in the V-form opening by working from the bottom. The process has been used in France; mostly for repairing steamship boilers.

The torch is the important factor in the success of this process, and the accompanying illustrations show the present development in this country of a French torch. The upper pipe of the welding tool, Fig. 1, carries the oxygen, varying in pressure from 8 lbs. to 30 lbs. per sq. in., the variations in pressure being due to the different sizes of tips used, according to varying thicknesses of the metal. The lower pipe carries the acetylene gas, in pressure of about 1 lb. per sq. in., a regulator reducing the pressure from 15 lbs. in the tank. The oxygen enters the tip through the small opening in the

direct line of the flow, while the acetylene enters through four openings drilled at right angles to the line of flow. These openings are accurately bored to admit the proper proportions of the gas, but in addition to this the operator throttles the flow of the gases into the torch to obtain the required flame. The tips seen in the cuts are inserted into the head of the torch, the back end of the tip forming a ground joint with the oxygen conduit. The acetylene ports are inside the head. The mixing chamber, of very small diameter and from 1 to 2 in. long, is within this tip, and the mixture of the gases takes place, within the tip instantaneously, with the combustion just outside of it. Stoppage of the flow of the gases will cause "flash-backs," but this never occurs to any serious extent in the form of torches shown. The enlarged portion of the acetylene pipe forms a convenient handle for the torch and also provides a chamber, packed with porous material, through which the acetylene supply must pass. This porous material also would prevent the flame being carried back into acetylene hose in the event of a flash-back.

The action in cutting is a chemical one and consists in first heating the metal, by using the welding flame only, to

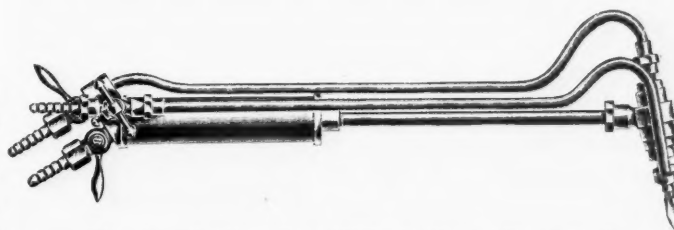


Fig. 2—Welding Tool With Cutting Attachment.

about 6,000 deg. Fahr.; this at the point of starting the cut. When this temperature is reached, as will be evidenced by the color of the metal, an additional stream of pure oxygen is turned on from a second oxygen reservoir, the pressure in which is varied from 125 lbs. to 175 lbs. per sq. in., according to the thickness of the metal to be dealt with. The result is a chemical union of the oxygen and the carbon of the metal, the additional oxygen causing a disintegration of the metal. The force of the blast carries the disintegrated metal before it, and as the torch advances, a narrow opening, or cut, results. The accompanying illustration, Fig. 3, shows this cutting process. The tool is being moved upward. By reference to Fig. 2, it is seen that the additional oxygen pipe is not an integral part of the torch, but is temporarily clamped to it. From Fig. 3 it will be seen that the oxygen follows the oxy-acetylene flame. The cut end of the I-beam gives a good idea of the action of the blast, the successive grooves resulting from the blowing out of the molten metal. The time required to make a cut through the I-beam shown in the illustration was less than five minutes. In cutting a beam of this kind, three separate movements are required; one across each flange, and the third along the web. The containing vessels for oxygen and acetylene are shown in the illustration, with their regulators and pressure indicators. In Fig. 4 the oxy-acetylene flame is being used in welding a truck bolster, which has been cracked transversely at the side bearing. It will be noticed that the flame is very small. As it does not cause any glare nor reflect any considerable amount of heat, neither shields nor gloves are used by the operator. In the case of making a weld on a truck bolster it would not be necessary to remove it from its position beneath the car.

There are two distinct forms in which the acetylene gas may be used, one the so-called dissolved acetylene, and the other in which the gas is used direct from a generator. Dissolved acetylene is the gas which has been absorbed in acetone in a storage vessel. This acetone has the property of absorbing about twenty-five times its own volume for each

atmosphere of pressure. The steel tanks, or storage vessels, are filled to about 80 per cent. of their volume with a porous material, after which acetone is poured in and the acetylene gas is then compressed into these tanks under pressure as great as 150 lbs. per sq. in. While dissolved acetylene is more desirable for portable uses, the gas which is generated direct from the lump carbide in a pressure generator is made at about one-half the cost of the dissolved gas. The generator consists mainly of a large vessel partly filled with water. Lump carbide is allowed to drop into the water from a hopper, being fed automatically by a mechanism which is controlled by a pressure diaphragm. When the gas is drawn from the generator for use, causing a drop in the generator pressure below a fixed point, the automatic mechanism feeds additional carbide into the water, which restores the gas and increases the pressure in the generator.

The extent to which this process becomes an accepted one for welding and cutting metals will depend upon the skill which is attained in the use of the torch. In the hands of a competent operator there is no difficulty; but the apparent simplicity of the use of the torch, or tool, has led less skilful operators to use it with unsatisfactory results. In view of this the company which controls the apparatus here described in the United States maintains a school of instruction for prospective users. Although the tip is arranged to provide for the proper mixture of the gases, the quality of the flame depends directly upon the absolute control of the flow of the mixture. An excess of oxygen will oxidize the metal and an excess of acetylene will carburize it, in either of which cases a defective piece of work results.

The welding of metals with this flame is not confined to uniting pieces of the same metal. It is possible to weld cast

welded portion was in direct contact with the flame, it is said that the joint was permanent. In another instance considerable repairing was done on the high pressure boilers of the steamship "Germania" in January of the present year. These repairs consisted in welding at several places in the fireboxes. The ship has made several voyages between New York and Naples since the repairing, and the fireboxes have, it is said, been in the best condition. The process is of particular interest to electric railways, because it is possible to effect a permanent weld between a copper bond and a steel rail.

The accompanying illustrations were reproduced from photo-

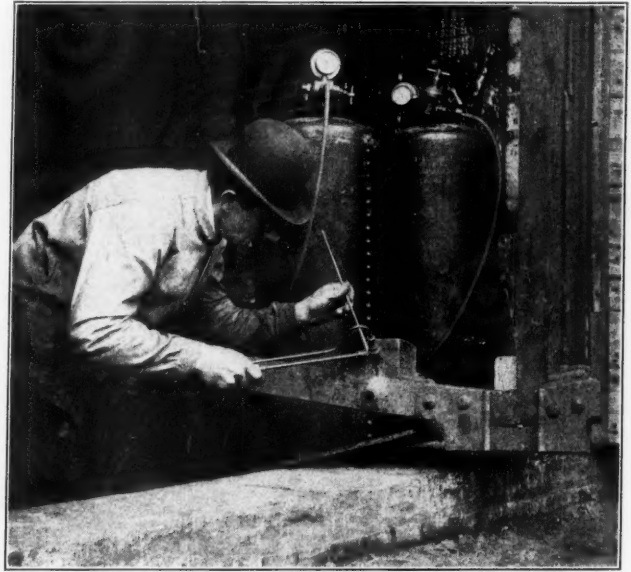


Fig. 4—Welding a Cracked Truck Bolster.

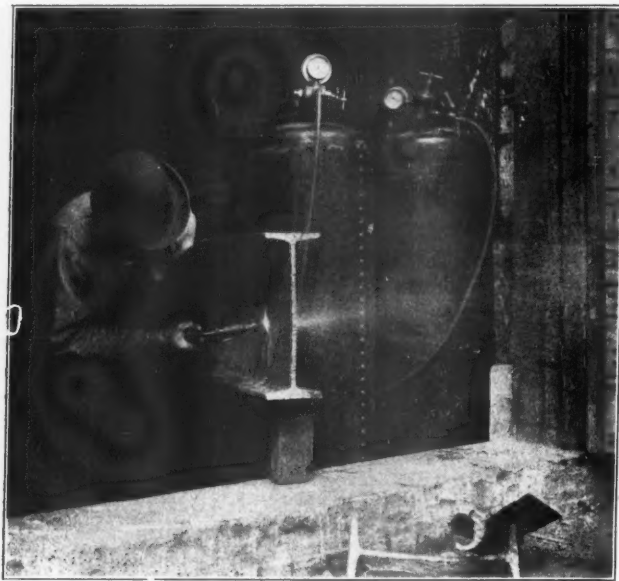


Fig. 3—Cutting I-Beam.

iron to steel; copper to steel, etc. As a repair tool in a machine shop, the oxy-acetylene torch can be put to a large number of uses, such as welding broken gear teeth into position; the placing of bosses on castings in cases of changed design; filling metal into blow holes in castings which would otherwise be useless. Probably the most valuable use of this process will be in connection with locomotive boilers. In France, where the greatest progress has been made, a sheet 27 in. wide and extending entirely around a firebox, an area equal to about one-fifth of the surface of the plate, was cut out with the oxy-acetylene and oxygen flames. The new sheet was inserted in the opening, and the necessary joints were made by welding the edges of the sheet. Although this

graphs taken at the Jersey City factory of the Davis-Bournonville Co., New York, where every kind of repairing is being done, and where the employees of purchasers of these oxy-acetylene plants are being instructed in the proper manipulation of the torch. The following table shows the cost of welding and cutting by this process. These cost figures are based on 3 cents per cu. ft. as the price of oxygen, 1 cent for acetylene, and 30 cents an hour for labor:

Approximate Cost of Oxy-Acetylene Welding

Tip No.	Thickness of metal, in.	Consumption, per hr. Acetylene, cu. ft.	Oxygen, cu. ft.	Proper pressure in lbs., oxygen.	Lin. ft. welded, per hr.	Total cost, per hr.	Cost, lin. ft., cents.
1	1/32 to 1/16	2.8	3.6	8 to 10	50	\$0.436	0.87
2	1/16 " 3/32	4.5	5.7	10 " 12	30	.316	1.72
3	3/32 " 1/8	7.5	9.7	12 " 14	25	.666	2.66
4	1/8 " 3/16	11.7	15.0	14 " 18	16	.867	5.4
5	3/16 " 1/4	18.0	23.0	18 " 22	10	1.17	11.7
6	1/4 " 5/16	25.0	32.0	20 " 25	7	1.51	21.6
7	5/16 " 3/8	32.5	41.5	22 " 27	5	1.87	37.4
8	3/8 upward.	48.5	62.0	24 " 30	..	2.64	...

Approximate Cost of Cutting Steel.

Cutting tip, No.	1	2	3
Welding tip No.	4	4	5
Thickness of steel, in.	Up to 1/2	1/2 to 1 1/2	1 1/2 up.
Heating jet, feet of acetylene.	12	12	18
Heating jet, feet of oxygen.	15 1/2	15 1/2	23
Cutting jet, feet of oxygen.	60	75	95
Pressure of oxygen heating jet, lbs.	14 to 18	14 to 18	18 to 22
Pressure of oxygen cutting jet, lbs.	125	125 to 150	150 to 175
Lineal feet cut per hour.	60	50	40
Total cost per hour.	\$2.68	\$3.13	\$4.02
Cost per lin. ft., cts. ....	.0447	.0627	.1005

The German railroads are providing for what may be called field hospital trains, each of which will have a surgeon on hospital car. There will be 111 such emergency trains, so stored that any place may be reached within half an hour from the time when the train is summoned, which may be done by telephone from many road watchmen in shelters between stations. Baden has recently ordered five hospital cars, equipped with almost every imaginable appliance for such trains. Each has beds for eight patients.

General News Section.

The Boston Elevated Railway, operating the surface street railroads of Boston, lately dismissed 92 conductors on the same day, for the reason that their accounts were unsatisfactory.

At Lynchburg, Va., Sept. 15, J. H. Crabill and E. H. Crabill pleaded guilty in the Federal Court to the charge of using railroad passes in violation of law and were fined \$200 and \$100 respectively.

Nelson B. Mapes, Station Agent of the Erie Railroad at Howells, N. Y., has just completed his fiftieth year in that position, and is the subject of a brief sketch and portrait in a local paper.

Press despatches from the City of Mexico say that the Mexican government railroads intend to do the express business on their lines. The contract of Wells, Fargo & Co. for handling express business on the Mexican Central will expire on December 31.

The Southern Railway has resumed the practice of depositing funds in Georgia banks. These deposits aggregate \$600,000 monthly. Several months ago the road withdrew its deposits from Georgia because the Georgia garnishment laws worked a hardship. During this time funds were sent by express to Birmingham and Chattanooga.

The Oklahoma Supreme Court has handed down an opinion holding that the State Corporation Commission has jurisdiction to determine the kind of crossings which shall be made at the intersection of two railroads and to prescribe the specifications necessary to insure safety and convenience. The decision was rendered in a case in which the Atchison, Topeka & Santa Fe had appealed from an order of the Commission fixing the character of the crossing of the Bartlesville Interurban with the Santa Fe at Bartlesville.

The State Board of Tax Commissioners of Oregon has assessed all the railroad property in the state at \$119,525,433. This figure does not include the Tacoma Eastern. Telegraph companies were assessed at \$422,834 and street railway companies at \$25,000,000. The assessment of railroad property is about \$76,000,000 more than it was last year, and is substantially 60 per cent. of the valuation placed upon the properties by the State Railroad Commission. The assessment on the Northern Pacific was \$66,600,000; of the Great Northern \$35,400,000; of the Oregon Railroad & Navigation Company \$9,900,000, and of the Spokane, Portland & Seattle \$3,000,000.

The New York State Public Service Commission, Second district, has issued a circular to the railroads of the state reminding them to be careful, in making their fall time-tables, not to take off too many of the trains which have been run during the summer. When the fall reduction of train service is made, people begin to send complaints to the commission, and the roads are warned not to do anything which will give just cause for such complaints. The commission desires to be informed as early as possible of all proposed reductions in service, with the reasons for the reduction. The reasons being given, the commission may perhaps be able to satisfy complainants without calling upon the roads to answer them.

The State Treasurer of Texas has sent out a circular asking the private car companies doing business in the state to send in quarterly reports, for the four quarters beginning October 1, 1907, and January 1, April 1 and July 1, 1908, of the gross receipts derived by them from their business in Texas. The treasurer acts under the law passed by the legislature in 1907, which requires car companies to make quarterly reports of their gross receipts within the state and to pay an occupation tax for each quarter equal to 3 per cent. of these receipts. It is stated that out of about 100 car companies doing business in Texas, the American Refrigerator Transit Co., St. Louis, and the National Railroad of Mexico are the only two that have filed any of the required reports.

The public land committee of the Chicago city council has had investigators at work for some time trying to find how many tracks are being used by railroads in Chicago for

which there are no ordinances. The first road called before the committee was the Chicago, Milwaukee & St. Paul, which, it was charged, was operating about 70 tracks unlawfully, of which about 50 per cent. are strictly industrial tracks and the other 50 per cent. operating tracks used by the road in its own business. The St. Paul has taken the position that where ordinances were originally secured by the industries and have since expired, the industries, and not the railroad, should be required to secure their renewal. In a good many cases this situation of affairs has been found to exist. The St. Paul has indicated its willingness to negotiate directly with the city in regard to other tracks. It is expected that the result of the agitation of the subject will be a definite settlement among the railroads, the concerns having industrial tracks and the city of Chicago as to the basis on which all such tracks shall be operated and as to who is to pay the city for the right of way.

At a meeting in New York on September 28 the Car Service Committee of the American Railway Association will consider the advisability of recommending a change in the Association's uniform car service rules to conform to a recent ruling of the Interstate Commerce Commission regarding demurrage on private cars. The Commission, in its opinion "In the Matter of Demurrage Charges on Privately-Owned Tank Cars," I. C. C. No. 933, held that "private cars owned by shippers and hired to carriers upon a mileage basis are subject to demurrage when such cars stand upon the tracks of the carrier, either at point of origin or point of destination, but are not so subject when upon either the private track of the owner of the car or the private track of the consignee." A rule in accordance with this ruling was inserted by the American Railway Association last spring in its recommended uniform demurrage rules. More recently the Commission has held that the above ruling shall apply also to "cars owned and leased to shippers by private corporations." It is this ruling of the Commission to which the Car Service Committee will consider recommending that the uniform car demurrage rules shall be made to conform.

The executive committee of the Nebraska State Railway Employees' Protective Association, by its Chairman, F. M. Ryan, and its Secretary, M. J. Roche, has sent a circular letter to the members of this organization. After referring to the growth in the membership of the association, the circular says in part: "The time has passed when the railroad employees of this state will stand idly by while our interests are assailed and our rights are swept aside, for the sole purpose of benefiting some politician who seeks the credit and emoluments of office at our expense. We desire to make clear that it is not our purpose to prevent, obstruct or oppose the passage of any measure which the general welfare of the state demands, but we do propose to see to it that our interests shall, hereafter, receive the same consideration as all other classes of citizens, taxpayers and voters, instead of being ignored by the professional politician. We wish to especially direct your attention to the coming political campaign, and impress upon you the necessity of carefully looking into each candidate's record as to his ability and his attitude relative to our interests. It must be clearly understood by those seeking office that we will support none but those who will give our interests the full and fair consideration accorded to others. We do not antagonize the interests of the banker, merchant, manufacturer or farmer, but regard them as our friends whose interests and ours are mutual. We have already gone on record favoring federal supervision of railroads and the adjustment of unfair rates, and stand ready at all times to support legislation which tends to promote equally the interests of all."

Individual Car Owners' Association.

The annual meeting of this association was held at Chicago, September 1, and every member except two was represented either by an officer or by proxy. The report of the president gave a full and complete exhibit of the activities of the association during the past year. The object of this association,

as our readers know, is to promote just and equitable relations between owners of private cars and the railroads using the cars; and the secretary has regularly sent to all private car owners, whether members or not, full information of what the association is doing.

A committee, consisting of President Johnston, Secretary Bailey and Vice-President Pierce, was named to revise the constitution and by-laws. A committee, consisting of the President, the Secretary, Vice-President Pierce and D. E. McMillen, was appointed to confer with the arbitration committee of the Master Car Builders' Association, concerning a number of features of the interchange rules which are not satisfactory to the private car owners. This conference was held in Chicago, September 5, and as a result, at the invitation of the M. C. B. committee, the car owners' committee will prepare a report recommending the changes that are desired in the rules; and Secretary Bailey, whose office is at 8 Market street, Pittsburgh, Pa., desires all private car owners to send to him promptly a memorandum of such changes in the rules as they deem desirable.

The Monongahela River Consolidated Coal & Coke Company, one of the members of the association, has had extensive correspondence with the principal roads which take coal from its mines regarding a number of breakages to the coal company's cars, which, it is alleged, were due to rough handling, but for which, according to the interchange rules, the owners were unable to collect pay. It is declared that the rough usage was directly due to violation of plain rules of the M. C. B. Association. As between railroads using each other's cars, these rules may not be inequitable; but as applied to the cars of a coal company which lends cars but never borrows, the association insists that the rules are unfair and ought to be changed.

The following officers were unanimously elected for the ensuing year: President, C. O. Johnson, Pittsburgh, Pa.; Secretary, Robert J. Bailey, Pittsburgh; Treasurer, George Osius; First Vice-President, W. E. MacEwen; Second Vice-President, Silas A. Shafer; Third Vice-President, Norman M. Pierce. The members of the Executive Committee are the five officers above named, and W. L. Hodgkins and R. D. Williams. The next annual meeting will be held in Detroit, September 7, 1909.

Plain and Forcible Language.

Some women of Chicago are circulating a petition, to be sent to the city council, which says, in part:

"The undersigned . . . respectfully represent that the manner in which the Illinois Central Railroad operates its trains and engines, causing the district in which we reside to be inundated with dirt, smoke and cinders, and the day and night to be hideous with the noise of escaping steam through starting and stopping its engines, constitutes an unbearable public nuisance and is inimical to the health, welfare and opportunity to live in ordinary comfort and decency of the residents of this district. Repeated complaints to the railroad company and attack by a public-spirited press have failed to achieve results. . . . The electrification of the road has been suggested and thoroughly canvassed and should now be ordered. . . ."

The women also sent a letter to E. H. Harriman, in the course of which they said:

"We propose to circulate the enclosed petition from house to house on every block afflicted. If you will accept now the inevitable and voluntarily promise to electrify the Chicago terminal you will save us much labor and it will make you and your road more popular with the people of Chicago."

International Refrigerating Industries Congress.

The announcement of an international congress of the refrigerating industries to be held in the hall of the Sorbonne, Paris, October 5 to 10, has already been printed in the *Railroad Age Gazette* (July 10, page 492). J. C. Stubbs, Vice-President of the Southern Pacific, is chairman of the American railway and steamship section. In the list of papers to be presented by Americans on transportation subjects are the following:

Railroad Refrigeration Service Association—Its Origin and Aims. By E. F. McPike, Refrigerator Service Bureau, Illinois Central, Chicago.

Refrigeration of Dairy Products and Dressed Poultry in

Transit. By Geo. B. Horr, Assistant General Western Agent, New York Central Fast Freight Lines, Chicago.

Modern Icing Stations as Constructed in the United States. By W. J. Frein, Architect, Chicago, Burlington & Quincy, Chicago.

Standard Construction of a Modern Ice Factory by a Railroad. By C. M. Secrist, General Manager Pacific Fruit Express, Chicago.

Improved Methods of Handling Manufactured Ice at Ice Plants and Icing Stations. By Frank H. Abbey, Hudson, N. Y.

Refrigeration of Fresh and Other Meats in Transit. By D. I. Davis, Packing House Specialist, Chicago.

Refrigeration of Citrus Fruits in Transit from California. By J. S. Leeds, Manager Santa Fe Refrigerator Despatch, Chicago.

The Extension of Markets Through Improvement in the Handling and Refrigeration of Horticultural Products. By G. Harold Powell, Pomologist in Charge of Fruit Transportation and Storage Investigations, Bureau of Plant Industry, United States Department of Agriculture, Washington.

Refrigeration by Ocean Steamships. By W. G. Sickel, Assistant to General Manager, Hamburg-American Line, New York.

Modern Car Ice Tanks. By Gebhard Bohn, St. Paul, Minn. American Practice in Refrigerator Car Construction. By E. F. Carry, Vice-President American Car & Foundry Co., Chicago.

Mechanical Refrigeration Applied to Freight Cars. By Cassius C. Palmer, Member American Society Refrigerating Engineers, New York, N. Y.

J. F. Nickerson, 315 Dearborn street, Chicago, is secretary of the American section. The secretary of the British section is R. M. Leonard, London.

Southern Pacific Rifled Pipe Line in Service.

The long rifled pipe line of the Southern Pacific Company for conveying California crude oil, which was described in the *Railroad Gazette*, June 7, 1907, and in *The Railway Age*, December 13, of the same year, was put in operation last week. This line is 256 miles long, extending from Delano, in the Kern river oil fields, to Porta Costa, on San Francisco bay. The pipe is 8 in. in diameter and its estimated capacity is 23,000 barrels each 24 hours. It is now delivering 17,000 barrels daily, and the pumps and all the mechanism work smoothly and satisfactorily. The total estimated cost of the line at the time of letting the contract was between \$4,000,000 and \$5,000,000.

Texas Railroads' Reasons for Raising Rates.

The Texas & Pacific and the International & Great Northern have filed with the Interstate Commerce Commission their answers to the complaint of the Railroad Commission of Texas against the proposed advance in interstate rates to Texas points. The answers filed by other railroads in this proceeding were summarized in the *Railroad Age Gazette*, September 4, p. 874.

These roads deny that they are parties to any conspiracy to advance rates. The International & Great Northern denies that its stock is owned or controlled by any of the Gould railroads and states that the stock is held almost entirely by the estate of Jay Gould. It has never received an adequate return upon its investment and claims that its property is worth \$40,000 a mile; that it has never earned enough to pay its operating expenses, including taxes and 6 per cent. on a bonded debt of less than \$23,000 per mile; that it has never paid any dividends on its stock; that by the closest economy it has not been able to meet fixed interest charges and expenses, and is now in the hands of a receiver. It claims the Railroad Commission's valuation of \$18,749 per mile is incorrect and that the State Tax Board fixed its value at \$32,245 per mile. It attributes its small earnings to the fact that the Commission has made "constant and radical reductions in rates in the state." A statement of earnings and expenses for the fiscal year ending June 30, 1908, shows a net deficit of \$2,460,464; operating revenue is given as \$6,922,207; operating expenses \$6,558,707; total income credits \$387,912;

usual income debits \$783,350; interest on bonds \$1,415,881; interest on other obligations \$335,181; betterments and additions \$300,123; cost of surveys, etc., \$13,839.

The Texas & Pacific places its deficit for the year at \$1,645,320.

The International & Great Northern states that the order issued by the State Railroad Commission last fall, requiring it to purchase new equipment, would involve an expenditure of \$4,000,000 during three years. This money, owing to the policy of the Commission, could only be paid out of earnings, and the road already has a deficit. It adds that the order of the Commission made last spring, requiring it to make general improvements, calls for the expenditure of \$10,000,000 in five years, which amount must also come out of earnings. It adds that these orders are "unjust and unreasonable and utterly beyond the power of this defendant to comply with." "This is but one illustration," it adds, "of some of the conditions that exist in this territory under which the Texas lines operate."

Erie Canal Improvement.

The New York State Superintendent of Public Works has received bids for barge canal work on contract No. 66, east of Lockport. There were two bidders: E. M. Graves, of Cleveland, O., at \$791,191, and the Empire Engineering Corporation, of New York, \$750,685. The latter is the only bid received for a long time for large canal work which comes within the engineers' estimate. No bids have yet been received for barge canal contract No. 20, involving an expenditure of about \$4,173,900. The contract calls for dredging the Mohawk river from Rexford Flats to Little Falls, about 58 miles.

Uneconomical High Speed.

It was to be anticipated that the Cunard company would not be content that the Atlantic record should remain with the Indomitable, and so, on the first of the voyages along the shorter Atlantic route, the Lusitania has been showing of what she is capable. She has reduced the time of the passage by nearly four hours, and has fractionally exceeded the speed of the cruiser in its shorter voyage. It is a very fine performance upon which all concerned are entitled to congratulations. Yet it shows at the same time how very little is to be gained by these great speeds. The Lusitania, missing the tide, had to wait hours before she could proceed on her way beyond Sandy Hook. A much slower speed, that is to say, would have enabled her to reach New York at the same time.—*Westminster Gazette*.

And several hours were lost waiting for high tide in the Mersey.

Punctuality of Trains on the Interoceanic of Mexico.

George W. Hibbard, General Passenger Agent of the National Lines of Mexico, says that the Interoceanic of Mexico, in the maintenance of passenger train schedules, stands at the head of the list. On the eighteen trains (passenger and mixed) run daily, the records for July and August show averages as follows: July, 30%; August, 30 1/2%. This out of a possible 31. That is, if every train for every day of the month had maintained its schedule, the average would have been 31.

American Railroad Employees' and Investors' Association.

At conferences in Chicago on September 14 and 15 between officers of the western railroads and of the railroad brotherhoods, steps were taken toward the formation of an organization to be known as the American Railroad Employees' and Investors' Association. The association is to be composed of representatives of the railroads and representatives of the employees. The following statement, setting forth the purposes of the organization, was adopted:

"Its purposes shall be, by all lawful methods, to cultivate and maintain between its members such a spirit of mutual interest and such concern on the part of all of them for the welfare and prosperity of American railroads as will best promote their successful and profitable

operation for the benefit alike of their employees, investors and the public.

"To encourage by every proper method cordial and friendly feeling on the part of the public toward American railroads and their business.

"To publicly provide means and methods for obtaining consideration and hearing from all legislative bodies and commissions empowered to enact laws, rules, and regulations affecting the conduct and operation of railroads.

"To do whatever lawful things may be necessary to secure a fair return alike to capital and to labor interested in American railroads, with due regard at all times to efficient service, fair treatment and safety to the public.

"This association shall at no time be used for partisan political purposes, nor shall it take any part in controversies, if any, which may arise between railroad employees and railroad officials."

A temporary organization was effected by the election of A. J. Earling as President and P. H. Morrissey as Secretary. The following were elected as an executive committee to further the work of the organization:

For the railroads—A. J. Earling (C., M. & St. P.), E. P. Ripley (A., T. & S. F.), George B. Harris (C., B. & Q.), and B. L. Winchell (C., R. I. & P.).

For the employees—P. H. Morrissey, Warren S. Stone, E. B. Garretson and John J. Hanrahan.

The temporary organization will continue in effect for the present.

Among the railroad officers who attended the conference are the following: A. J. Earling (Chicago, Milwaukee & St. Paul), B. F. Yoakum (Rock Island-Frisco), George B. Harris (Chicago, Burlington & Quincy), J. T. Harahan (Illinois Central), F. A. Delano (Wabash), Theodore P. Shonts (Chicago & Alton), Frank Trumbull (Colorado & Southern), J. W. Kendrick and W. B. Jansen (Atchison, Topeka & Santa Fe), H. U. Mudge (Chicago, Rock Island & Pacific), H. I. Miller (Chicago & Eastern Illinois), A. J. Davidson (St. Louis & San Francisco), W. A. Gardner (Chicago & North-Western), C. S. Clark (Missouri Pacific), W. B. Scott (Union Pacific). All these, it will be noted, are executive officers.

The representatives of railroad labor organizations present were the following: P. H. Morrissey, Railroad Trainmen; Warren S. Stone, Locomotive Engineers; E. B. Garretson, Conductors, and John J. Hanrahan, Firemen, all chief officers.

The movement for the formation of this organization originated with the employees. The officers of the employees' organizations suggested to officers of the western railroads the desirability of a conference regarding the anti-railroad agitation. A meeting of executives of the western lines about ten days ago decided that such a conference was desirable and a call was then issued for the meetings of September 14 and 15. The only officer of an eastern line who was invited to attend was W. C. Brown, Senior Vice-President of the New York Central Lines. A telegram was received from Mr. Brown, stating that he was in entire sympathy with the movement, but that business engagements prevented him from attending the meeting.

The matter of extending the organization so as to include representatives of the eastern and southern lines will be taken up with the officers of these lines later, and favorable assurances on the subject have already been received.

Railroad officers say that the chief purpose of the organization will be the diffusion of information both among railroad employees and the public regarding railroad matters, with the object of creating a public sentiment less antagonistic to the carriers.

From the Telegrapher's Point of View.

What do you think of the eight-hour day by now? Gee, isn't it fine! Never knew what 12 hours, seven days a week, meant before until we got our eight-hour day. Life seems worth the living now. I am sure that the company is receiving better service from the boys, least trouble in the way of sleeping on duty and being away from the office. A chief clerk to a chief train despatcher told me that he had to keep a record of every delay in every case where a train was delayed on account of block, sleeping on duty, failure to show up on time, care of office, and everything that goes to make a bad showing. This will be turned over to the Interstate Commission in time. They are trying to down the eight-hour law. Keep your office off of that little book. * * * We

still have plenty of nons on this division, and some of them seem to be hard ones to crack. Let's keep after them, brothers.

I notice that the student at Hillsdale has ceased answering calls. Operator Mack, non, was told that if he did not keep that student out both of them would have to go. Will he never see the right way and come across?

F. R. McClusky, agent at Canfield, has resigned. Canfield is at present advertised and filled by a Mr. Powers. Mr. Powers has the enviable record of being a "professor" in a telegraphy school for the Erie at Youngstown. It is hoped that none of the boys will forget this act.

Some things make us wonder what is the depth of human depravity. The latest thing of this kind is the action of the first trick despatcher at Youngstown, L. E. Green. Two weeks ago Green was a respected despatcher; easy to get, quick to act, and cool headed. But times have changed. Now he does not answer the first call, has all operators report trains two or three times, and has all the other characteristics of a preoccupied mind. If one steps into the despatcher's office the reason for this change is apparent. For seated by Green's side, sandwiched between him and the wall, like "two-in-a-bun," are two girl students. That he should allow them to be there is past our comprehension. Mr. Green lets these "hams" send messages, train orders, and tells good operators to "g. a. Exa. 1800, east," in a "fist" sounding like a cross of ague and blind staggers. So let us all remember that when we are sending any dots or dashes on the train wire, that two of the "gentler sex" are wiggling their pretty ears in a frantic effort to catch what is being said. No doubt all brothers will so time their O. S. reports that these beauties (?) can read it. By actual observation a few days ago it took one of these girls 25 minutes to line the boys up for a 19 order. Ain't it the limit? We may add that Mr. Jones also has a girl seated beside him, but all the side-wire men will have nothing to do with these "operators."—*The Railroad Telegrapher*.

Defective Cars as They Appear in the Claim Department.

What, should you say, should be done in a case where shippers of sheet iron, which needs the best car obtainable, load a car which has painted on each side "Leaky roof; load only in coke trade." In parentheses, what can possibly be said of the Freight Claim Agent of the road on whose tracks the car was loaded, who argued as to this that "surely they would not have loaded a car marked in that way; it must have been so marked by some one afterwards, somewhere on the road." Cars have bolts projecting from floors or sides, which damage all sorts of things: bales of woolens, furniture, rolls of paper, articles innumerable. Nails, where dunnage had been fastened to sides of cars tear sacks and goods, and even tear and scratch live-stock. Roofs are loose, door fastenings gone, and all sorts of minor defects do damage or permit loss. Some cars are not properly constructed. Tank cars have a "leg" depending from the underside, through which oil is emptied. Because the opening down through the deck is too small for any "play" back and forth, the leg is sheared off when a car is bumped, and a claim follows. So small a thing as a "filler block," unsecured between draft sills on the "needle beam" next such a leg, has caused this sort of a claim. It tilted over until it became braced against the leg, and a hard jounce sheared the leg and spilled oil which cost \$685. Two 20-penny nails, or even the placing of the filler block on the other side of the tie-rod would have saved the road in whose care this happened just that much money.

Stock cars have all sorts of defects, and original sin, or whatever inspires the bedevilment of animals, almost always enables them to find such defects. They climb out of end windows, kick off slats, or root doors loose and escape at the bottoms. And the papers announced just before the October slump, that the Blank road had contracted for 500 new stock cars to be equipped with drop bottoms. Drop bottoms are producers. They gush coal claims. They have some of the most damnable (it seems the only word) contrivances for not securing them that ill-conditioned designers can conceive. And now, we are to have added to the other defects of the stock car, a patent-self-acting-system of bottom dumps for cattle, hogs and horses. And what will become of the watermelons, loaded preferably for ventilation into stock cars? Is there

an echo from around the corner? The Claim Agent will have to pay for them? He surely will.

The car door is a flowing well from out of which pours a stream of claims. No door should be in use which does not close in and fit flush with the sides of the car. No door should be so fitted as to allow that it be sprung, even sufficiently to permit the insertion of a hand, without the destruction of the device used to seal the door. And the grain doors; the cheap, sappy, cross-sawed lumber offal, illy-fitted, thin and bulged, which would be costly to the carriers as gifts; all these should go. But they will not be supplanted by better doors, because the "equipment" would cost that much more. It may be that this spring, this perennial stream, emanates from the President or the Chairman of the Board of Directors. A couple of dollars per car would mean ever so much in added cost of cars, though it might get a good door. Still, the door might be patented, and, oh! Lord!—how some people hate patents—unless they draw the royalty.—*S. D. Webster, St. Louis.*

Friends in the West.

"Are the people now more favorably inclined toward the railroads than in the recent year?"

"Undoubtedly, toward properly managed railroads. I found that when in the West. A year ago people seemed ashamed to be seen in the company of a railroad officer. Now they are trying to establish cordial relations with the railroads, and are showing their appreciation of the efforts of the roads. The further west, the more pronounced is the change."—*E. H. Harriman.*

Proposed Electrification of Melbourne Suburban Lines.

Thomas Tait, chairman of the Victorian Government Railways, has received the report prepared by Charles H. Merz, of London, Consulting Engineer, on the proposed substitution of electric traction for steam traction on the Melbourne Suburban System. The main conclusion is that on account of the great advantages to the public and the improvement in financial results to be expected from electrification, the installation of electric traction on the suburban railways is desirable on grounds of finance and of public convenience, and it should be carried out in the following stages:

- I. The Port Melbourne, St. Kilda, Sandringham and Broad Meadows branches, 29 miles.
- II. Stage I, and, in addition, the Camberwell and Williamstown branches, 65 miles.
- III. The complete scheme including, in addition to Stage II, the Sunshine, Coburg, Preston, Heidelberg, Dandenong and Mordialloc branches, 124 miles.

It would not be convenient to try and convert more than the lines in Stage I at first, nor financially advisable to convert less than the lines in Stage I. The total capital outlay for the conversion of the whole suburban system would be £2,227,050. If steam traction be retained, the expenditures on rolling stock only will be £408,358.

The expenses per train-mile with electric traction would be 11.0d., as against 18.9d. with steam. With the former, however, there would be a greater train mileage. The total operating expenses with electric traction for the whole suburban service would be £27,267 per annum less than with steam.

The total annual expenditure for the whole service, including 4 per cent. on the new capital outlay, would be £44,791 more than with steam. Against this must be put the additional revenue due to the improved service. The surplus, after paying interest on new capital for the complete scheme, would, with electric traction, be £40,251 greater than was obtained in 1906 with steam.

If electric traction be adopted, an increase of 20 per cent. over the present schedule speed with the existing tracks and termini and an increase of 71 per cent. in the train mileage are financially justifiable, and are covered by the expenses referred to above.

The adoption instead of locomotives of the multiple unit system of train operation is recommended, giving this increase of 71 per cent. in the train mileage, with an increase

of only 21 per cent. in the ton mileage. The existing bogie cars should be altered and used for the electric service. The total rolling stock required would be 496 coaches with electric working, as compared with 546 coaches and 110 locomotives with steam, the reduction in the number of coaches being due to the higher schedule speed.

Electrical System.—A direct current 800-volt system would be cheapest and best for this particular case. The current should be distributed from sub-station by a protected conductor rail. The sub-stations should be supplied with three-phase high-tension current from the power station by means of underground cables in the central areas, and by overhead lines in the less populous districts.

There should be a central power station at Yarraville to provide 35,000 electrical horse-power. This power station should be designed to burn either black or brown coal, and the power plant consist of water tube boilers and steam turbines.

Initial Scheme.—If electric traction be decided on, the scheme proceeded with in the first instance should consist of the Port Melbourne and St. Kilda and the Brighton and Essendon branches, involving, with power plant, an initial expenditure of £801,880. Such questions as systems of train despatching, automatic signaling, new block sections, special provisions for race traffic, etc., would be best deferred until part, at least, of the system is being worked electrically.

This Melbourne Suburban System is an extensive one, no less than 240 miles of track and 126 stations being affected by the present proposals, which, if carried out in their entirety, will ultimately involve an expenditure of over \$11,000,000. The report here summarized is long and exhaustive, forming a complete resumé of the most recent experience on the electrification question.

Traffic News.

Reports to the Railroad Commission of Texas show that holders of railroad passes traveled about 12,000,000 miles upon the railroads of that state in the year ended June 30, 1908.

The Texas & New Orleans has made a party rate for parties of 25 or more of 2 cents a mile between Louisiana and Texas points. For parties of not less than 10, a rate of 2½ cents a mile is made.

The Government will take an appeal to the Supreme Court of the United States in the suit against the anthracite coal carrying roads for violation of the "commodity clause" of the Interstate Commerce law, which was decided against the Government at Philadelphia last week.

The working committee appointed by the railroads to undertake the task of formulating a uniform classification of freight met in Chicago on September 15 to enter formally upon its work. The names of the members of this committee were given in the *Railroad Age Gazette* of July 17, page 545.

The United Fruit Co. has given notice that by the first of October the Jamaica-Charleston fruit steamers will once more be put on their regular run from the Indies to Charleston. An error in a Southern Railway tariff sheet showing too high a rate to New York caused the Fruit Company to withdraw this line of steamers several weeks ago.

Freight traffic, and also some passengers, are being carried now on nearly all portions of the line of the Grand Trunk Pacific from Winnipeg to the eastern base of the Rocky mountains. This does not mean that the railroad has been formally opened for business; but where the track is sufficiently completed, the work trains are used to accommodate the public needs whenever practicable.

The National Industrial Traffic League, at its meeting in St. Louis on September 14, adopted a form of non-negotiable bill of lading. In a resolution, the League declared that the bills of lading recommended by the Interstate Commerce Commission permit the railroads to assume less than their common law liability. Congress will be asked to embody in law a bill of lading recommended by the League, which reads as follows: "Received from (shipper's name) the property described below in apparently good condition, except as noted (contents

and condition of contents of packages unknown), to be transported and delivered in accordance with the provisions of the law in like good order to consignee."

Inquiries received by northwestern lines indicate that the travel to the Rosebud Indian reservation in South Dakota on the occasion, October 5 to 17, when lands in that reservation will be opened for settlement will be very large. When part of the reservation was opened four years ago, the registration was 106,000. The amount of land to be opened in October is twice as great as the amount opened four years ago, and a passenger officer of one of the lines most interested estimates that the number of persons who will make the trip to register in October will be 250,000.

The Federal grand jury at Quincy, Ill., has indicted the Illinois Terminal Railway and the Illinois Glass Company, both of Alton, Ill., on 12 counts for alleged rebating. It has also indicted the Illinois Terminal Railway separately on six counts for handling interstate commerce without having filed tariffs with the Interstate Commerce Commission. It is alleged that the terminal railway received through transcontinental shipments from the Indiana gas belt and set the cars out at the glass works at Alton, where the glass company took out some stock and replaced it with other goods, after which the cars were sent on to the Pacific coast. It is claimed that in this way the glass company was enabled to benefit unlawfully to the extent of 11 cents per 100 lbs. on its shipments. Furthermore, the terminal railway, it is alleged, had no tariff on file under which it could engage in through interstate business.

The Interstate Commerce Commission will begin a hearing at Chicago on September 17 on the complaint filed by George S. Loftus, of St. Paul, Minn., against the Pullman Company, in which it is alleged that the rates of the Pullman Company are 50 per cent. too high and should be reduced this much by the Commission. Mr. Loftus originally complained regarding only certain specific rates from Chicago and St. Paul. He subsequently amended his petition so as to make a general attack upon all of the rates of the Pullman Company. Commissioner Lane, it is stated, will hear the testimony. Chairman Knapp and other members of the Commission will meet in Atlanta Sept. 21 to consider the complaints which have been made by shippers against the railroads of Southeastern territory for advancing rates. The complaint lodged with the Commission by Southwestern shippers will be heard in St. Louis Sept. 28.

R. P. Allen, Chairman of the Arkansas Railroad Commission, has announced that the Commission will not compromise its litigation with the railroads over the validity of the 2-cent fare law of that state and the order affecting freight rates issued by the Commission, but will ask the legislature to furnish additional funds for carrying on the litigation; and the case will, if necessary, be carried to the Supreme Court of the United States. Mr. Allen says: "We have been bridled by a federal judge for the present. Until a final hearing in the matter we will not issue a new tariff, nor will we oppose the enforcement of the one issued by the railroad companies, regardless of how exorbitant it may be. We expect to ask the next legislature to make an appropriation sufficient to pay the expenses of this." It had been reported that the Commission would probably compromise with the railroads. (See *Railroad Age Gazette*, September 11, page 926.)

American Association of Freight Traffic Officers.

The following officers for the ensuing year were elected by the American Association of Freight Traffic Officers at its annual meeting in St. Louis on September 12: President, Robert C. Wright, General Freight Agent, Pennsylvania Railroad; First Vice-President, T. W. Galleher, General Freight Agent, Baltimore & Ohio; Second Vice-President, W. B. Groseclose, General Freight Agent, Missouri, Kansas & Texas; Third Vice-President, Charles R. Capps, General Freight Agent, Seaboard Air Line; Fourth Vice-President, George H. Crosby, Freight Traffic Manager, Chicago, Burlington & Quincy; Secretary-Treasurer, J. F. Auch, General Freight Agent, Philadelphia & Reading (Philadelphia).

Car Surpluses and Shortages.

In presenting bulletin No. 31 of the Committee on Car Efficiency of the American Railway Association, giving a summary of car surpluses and shortages from October 30, 1907, to September 2, 1908, Arthur Hale, Chairman, says:

"The total of surplus cars for the date of this report is 222,632, a decrease of 30,371 since the last fortnightly report.

petitive port with Philadelphia, the Pennsylvania carried for export 13,700,000 bushels, practically the same quantity as to Philadelphia. The total exports from Baltimore for the year aggregated 27,000,000 bushels. In Baltimore no lighterage is necessary.

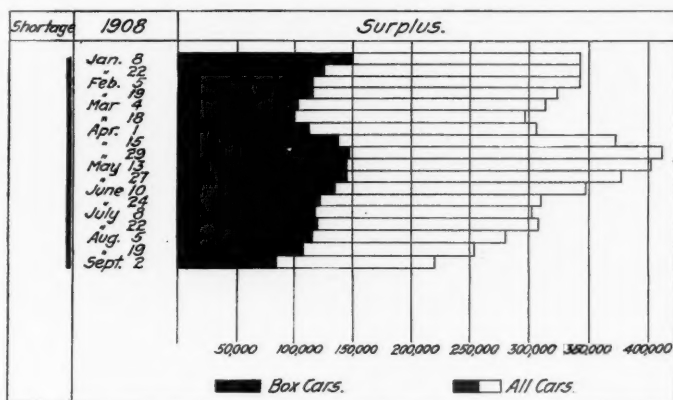
At Philadelphia the Pennsylvania has two water-front elevators with a combined capacity of 1,200,000 bushels, five barges—two of which were added recently—with a combined

CAR SURPLUSES AND SHORTAGES, MONTHLY, FROM OCTOBER 30, 1907, TO SEPTEMBER 2, 1908, INCLUSIVE.

Date.	Number of roads.	Surpluses.					Shortages.				
		Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
September 2, 1908.....	160	84,644	12,970	85,247	39,771	222,632	928	108	355	27	1,418
August 19, 1908.....	160	106,367	13,494	92,500	40,642	253,003	465	90	105	194	854
July 22, 1908.....	166	120,580	14,401	125,739	47,960	308,680	115	37	330	27	509
June 24, 1908.....	163	123,112	18,042	130,149	41,995	313,298	266	34	120	31	451
May 27, 1908.....	160	144,697	20,075	162,695	54,437	381,904	82	13	12	18	125
April 20, 1908.....	159	147,971	24,350	186,742	54,542	413,605	145	42	16	64	267
March 18, 1908.....	160	103,509	25,122	119,205	49,206	297,042	533	151	250	73	1,007
February 19, 1908.....	161	113,776	30,088	134,217	44,432	322,513	697	141	249	162	1,249
January 22, 1908.....	161	124,622	27,328	142,338	48,292	342,580	392	132	79	135	738
December 24, 1907.....	158	87,714	14,740	64,556	42,300	209,310	187	81	191	265	724
November 27, 1907.....	160	16,246	3,645	10,429	40,348	70,668	11,908	868	2,964	2,224	17,964
October 30, 1907.....	161	786	600	1,285	1,275	3,946	61,592	3,546	15,987	9,632	90,757

Of this decrease 21,723 are box cars, and 7,253 coal and gondola. The reports indicate also a further reduction of 7,662 in the number of bad order cars. The decrease in box cars, the largest since the maximum surplus was reached, is quite encouraging. It will be noted that there are small shortages reported in one or two groups. Whenever these shortages are of such nature and extent as to justify action by the com-

capacity of 140,000 bushels, and two floating elevators. The Keystone elevator has a dryer, the only dryer in a railroad elevator at Philadelphia. Grain to be treated in the dryers is hauled between the export elevators and the Keystone elevator free of charge. The plans for the new floating elevator were drawn up by the Motive Power Department of the Pennsylvania Railroad.



Car Surpluses and Shortages in 1908.

mittee, the conditions are brought to the attention of roads reporting a surplus and arrangements made to transfer the equipment to the road having use for it. During the past week the committee has been called upon in several instances for assistance in preventing local shortages."

The accompanying table gives the figures for October 30, 1907, to September 2, 1908, inclusive.

Handling of Export Grain at Philadelphia.

The Pennsylvania Railroad has just received a new floating elevator, to be used for transferring export grain at Philadelphia. It was built by the Harlan & Hollingsworth Company, Wilmington, Del. The new elevator has a capacity of 10,000 bushels of grain per hour. It is equipped with electric lights, and the highest grade of pumping and auxiliary machinery. Its towers are 70 ft. above deck, thus making it possible to rapidly load into any modern freight steamship. The length over all is 98 ft. 6 in.; the beam, molded, is 30 ft., and the depth from the top of the keel to the top of deck beams is 12 ft. During the year 1907, the total exports of grain from Philadelphia were 21,417,000 bushels against 20,055,282 bushels in 1906, and against 6,389,407 in 1904. In 1907, the Pennsylvania Railroad alone handled in Philadelphia 13,000,000 bushels, nearly 61 per cent. of the total, and over half of this was lightered. To Baltimore, the principal com-

Crop Conditions.

The condition on September 1, with comparisons, of the various crops investigated by the Bureau of Statistics of the United States Department of Agriculture is given herewith (100 representing a normal condition):

Crops.	September 1,		10-year average.	August 1, 1908.
	1908.	1907.		
Corn	79.4	80.2	81.0	82.5
Spring wheat	77.6	77.1	77.9	80.7
Oats	69.7	65.5	80.7	76.8
Barley	81.2	78.5	83.5	83.1
Buckwheat	87.8	77.4	86.5	89.4
Tobacco	84.3	82.5	83.7	85.8
Flaxseed	82.5	85.4	87.0	86.1
Rice	93.5	87.0	88.8	94.6
White potatoes	73.7	80.2	80.8	82.9
Sweet potatoes	88.7	85.7	85.3	88.8
Tomatoes	82.5	82.9	...	84.5
Cabbage	80.3	85.2	...	84.5
Onions	85.8	88.0	...	88.4
Beans	82.8	82.7	...	...
Apples	52.3	34.7	54.7	52.2
Peaches	67.5	30.7	53.0	67.1
Grapes	84.6	81.1	83.0	87.1
Pears	74.1	...	...	70.6
Watermelons	80.8	76.3	...	79.5
Cranberries	67.7	77.7	...	...
Oranges	88.2	84.1	...	89.1
Lemons	92.9	91.4	...	93.0
Sugar cane	91.3	94.1	90.4	88.3
Sorghum	85.5	82.4	...	85.4
Sugar beets	86.0	92.4	...	87.3
Broom corn	76.6	82.8	...	80.3
Hemp	73.0	85.9	...	77.4
Hops	79.3	88.5	...	86.4
Peanuts	86.0	85.6	...	85.5
Cotton (August 25)	76.1	72.7	73.9	83.0
Alfalfa (production)	90.7	91.8	...	88.8
Cloverseed (compared 1907, pr ct.)	120.0	99.6	...	...
Cloverseed (condition)	89.7	76.5	...	89.7
Millet	86.9	84.4	...	86.3
Kafir corn	85.1	83.1	...	...
Hay, yield, per acre, tons	1.52	1.45	1.44	...
Hay, yield, tons (000's omitted)	67,743	63,677	...	...
Hay, quality	94.5	90.4	...	...
Rye, yield, per acre, bush.	16.4	16.4	15.8	...
Rye, yield (000's omitted), bush.	30,921	31,566	...	...
Rye, quality	92.7	91.6	...	...
Stock hogs No. compared with preceding year	92.5	101.9	...	...
Stock hogs, condition	94.5	96.0	...	...

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The *Bessemer & Lake Erie* is receiving bids for 24 locomotives.

The *Union Railroad*, Pittsburgh, Pa., is in the market for 10 locomotives.

The *Fruit Belt, Power & Irrigation Co.*, 501 Mining Exchange building, Colorado Springs, Colo., is in the market for one electric locomotive.

The *Bulgarian State Railways* have ordered four passenger engines from the American Locomotive Co. These engines will cost 416,000 francs (\$83,200).

The *Nezperce & Idaho (Electric)* is in the market for a steam locomotive to be used until electric power is installed, when an electric locomotive will be purchased.

The *Prairie Pebble Phosphate Co.*, Mulberry, Fla., as reported in the *Railroad Age Gazette* of September 11, has ordered two 20-ton electric freight locomotives from the Baldwin Locomotive Works and the Westinghouse Electric & Manufacturing Co. They are to be of the eight-wheeled, double truck, four-motor type, for operation on standard gage track. Driving wheels are to be 33 in. in diameter, driving wheel base 18 ft., truck wheel base 6 ft., full load speed on level 9½ miles per hour, with a full speed drawbar pull of 5,500 lbs., and starting drawbar pull of 10,000 lbs. Frames and housings are to be of steel. Motors are designed to be controlled by hand from 550-volt direct-current circuit. Westinghouse air-brakes will be used. The engines are to be used for general freight hauling over the tracks of the *Prairie & Kingsford Railroad*, which is owned and operated by the *Prairie Pebble Phosphate Co.* Delivery is to be made in three months.

CAR BUILDING.

The *Girard Coal Belt*, Girard, Mo., is in the market for one car.

The *Nezperce & Idaho (Electric)* will soon be in the market for a number of cars.

The *Iowa Central* has ordered 50 fifty-ton steel side dump cars from the Pressed Steel Car Co.

The *Ziegler Coal Co.*, Ziegler, Ill., has ordered 150 mining cars from the Watt Car Co. The cars are to have wood bodies, steel underframes, automatic drop bottoms, and automatic drawheads and couplers.

The *Dairy Shippers Despatch*, as reported in the *Railroad Age Gazette* of September 11, has ordered 100 thirty-ton refrigerator cars from the Ryan Car Co. for November delivery. The cars will be of all-wood construction, and will be 36 ft. long, 9 ft. wide and 7 ft. 5 in. high, over all dimensions. The special equipment includes:

Bolsters	Seullin-Gallagher
Brake beams	Chicago Ry. Equip.
Brakes	Westinghouse
Couplers	Excel, Seullin-Gallagher
Draft rigging	Farlow
Journal bearings	Standard Metal Mfg. Co.
Journal boxes	McCord

The *Atchison, Topeka & Santa Fe*, as reported in the *Railroad Age Gazette* of September 11, has ordered 500 thirty-ton refrigerator cars from the American Car & Foundry Co., for delivery on December 1. The special equipment includes the following:

Axles	Steel
Bolsters, body and truck	Steel
Brake beams	Creco
Brakes	Westinghouse
Couplers	R. E. Janney
Draft rigging	Miner
Journal bearings	Hewitt
Journal boxes	Kirby
Springs	Simplex

The *Chicago & Alton*, as reported in the *Railroad Age Gazette* of August 28, has ordered 1,000 all-steel, 50-ton gondola cars from the Standard Steel Car Co. for delivery about November 15. The cars will weigh about 40,000 lbs. and will be 40 ft. long, 9 ft. 5½ in. wide and 4 ft. 2 in. high, inside measurements, and 40 ft. 8½ in. long, 10 ft. wide and 8 ft. 7 in. high, over all. The special equipment includes:

Brake beams	Acme
Couplers	R. E. Janney
Draft rigging	Miner
Journal bearings	Hewitt
Journal boxes	McCord
Springs	Railway Steel Spring
Trucks	Arch bar

The *Harriman Lines*, as reported in the *Railroad Age Gazette* of September 11, have ordered 2,450 fifty-ton box cars, 1,000 fifty-ton flat cars and 450 ballast cars from the American Car & Foundry Co.; 170 fifty-ton hopper cars and 450 fifty-ton gondola cars from the Cambria Steel Co.; 450 forty-ton stock cars, 50 thirty-ton furniture cars and 70 cabooses from the Standard Steel Car Co. Delivery of the order from the American Car & Foundry Co. will begin on November 16, 1908. The box cars will be divided among the various lines as follows: Union Pacific, 450; Oregon Railroad & Navigation, 500; Oregon & California, 200; Galveston, Harrisburg & San Antonio, 500; Houston & Texas Central, 300; Oregon & Washington, 500. The flat cars will be divided as follows: Oregon Railroad & Navigation, 50; Oregon & California, 50; Galveston, Harrisburg & San Antonio, 200; Houston, East & West Texas, 300; Cananea, Yaqui River & Pacific, 150; Oregon & Washington, 250. The ballast cars will be divided as follows: Southern Pacific, 150; Central Pacific, 100; Cananea, Yaqui River & Pacific, 100; Oregon & Washington, 100. The orders from the Cambria Steel Co. and the Standard Steel Car Co. will be delivered within 60 to 90 days. The hopper cars will be divided as follows: Union Pacific, 120; Oregon & Washington, 50. The gondola cars will be divided among the various lines as follows: Southern Pacific, 25; Central Pacific, 25; Houston & Texas Central, 300; Sonora Railway, 40; Oregon & Washington, 100. The fifty furniture cars are to be used on the Union Pacific, and the stock cars are to be divided as follows: Union Pacific, 50; Oregon Railroad & Navigation Co., 100; Galveston, Harrisburg & San Antonio, 200; Oregon & Washington, 100. The cabooses will be divided as follows: Oregon Railroad & Navigation, 10; Oregon & California, 10; Cananea, Yaqui River & Pacific, 25; Sonora Railway, 4; Gila Valley, Globe & Northern, 4; Phoenix & Eastern, 2; Oregon & Washington, 15.

IRON AND STEEL.

The *Great Northern* is asking prices on 2,000 kegs of railroad spikes.

The *Interborough Rapid Transit Company* is in the market for 1,800 tons of structural steel.

The *Michigan Central* has ordered 200 tons of structural steel from the American Bridge Co.

The *Isthmian Canal Commission* will receive sealed proposals until October 5, 1908, for 200 tons of 70-lb. rails.

RAILROAD STRUCTURES.

HARRISON, N. J.—President McCrea, of the Pennsylvania, is quoted as saying that ground will be broken shortly for a large passenger station.

LOUISVILLE, KY.—The plans and specifications for the Oak street subway, between Eighth and Tenth streets, under the tracks of the Louisville & Nashville, have been completed by Maj. Joseph P. Claybrook, City Engineer. Actual construction will probably not begin until next year. It is expected, however, that the contracts will be placed within the next few weeks. The cost of this subway is estimated at \$110,000, one-half of which will be paid by the railroad.

MINNEDOSA, MAN.—An officer of the Canadian Pacific writes regarding the rebuilding of the roundhouse, which was destroyed by fire, that the new roundhouse will be of brick,

with concrete foundations. It will have eight stalls and will cost \$27,000. The work will be done by the company.

NORWALK, OHIO.—Regarding the extent of the damage by fire to the Wheeling & Lake Erie shops and as to the location and dimensions of new buildings which are to replace the ones burned, an officer writes that the machine shop building which was destroyed by fire was 100 ft. x 390 ft. This building was of brick and frame, containing the machine shop, boiler shop and blacksmith shop. In addition to this the power-house, 92 ft. x 120 ft., was entirely destroyed with contents; also tank repairing shop and carpenter shop, including pattern room and paint shop. This building was 172 ft. x 110 ft. The Master Mechanic's office and storehouse, 45 ft. x 120 ft., were entirely destroyed. A great many tools in the machine shop were so badly damaged that they will have to be scrapped, also a considerable amount of stock in store room was entirely destroyed, as were the contents of the tank shop, pattern room and paint shop. In addition to the destruction of machinery in the machine shop, ten locomotives were seriously damaged by fire. The estimated loss is about \$350,000. In regard to the new shops, the location or dimensions of these buildings are not yet decided on. The company will probably build temporary shops at Norwalk to take care of the requirements with a view of placing the main shops at Brewster, Ohio, in the near future. (Aug. 28, p. 829.)

TACOMA, WASH.—The Harriman Lines and Northern Pacific are said to have reached an agreement regarding the terminals and crossings in Tacoma. Under the terms of agreement the Northern Pacific will receive \$600,000 for damages incurred because of the construction of tracks across its right of way in Tacoma, and for 12 acres of tide lands to be used for freight terminals. An official of the Union Pacific is credited with the statement that work will begin at once on the new passenger terminals and depot in that city.

VANCOUVER, B. C.—The Great Northern has approved plans for its proposed Vancouver terminals to cost about \$500,000, including improved wharfage facilities on Burrard Inlet, increased yards and the erection of several small buildings.

SIGNALING.

The St. Louis & San Francisco is asking bids for the installation of automatic block signals on about 720 miles of its lines, approximately 1,200 signals.

SUPPLY TRADE NOTES.

The Bucyrus Co., Milwaukee, Wis., has increased its capital stock from \$300,000 to \$1,000,000.

S. E. Gutterridge has been elected President of the Republic Railway Appliance Co., St. Louis, Mo.

The Cleveland Crane & Car Co., Wickliffe, Ohio, has opened a Chicago office at 1203 Marquette building, in charge of W. A. Rider.

The Crocker-Wheeler Co., Ampere, N. J., has built a brick and cement post-office building on its grounds to facilitate handling mail at the Ampere post-office.

A consular report says that a contract has been let for a small plant near Mexico City, Mexico, for making Portland cement, this being the first Portland cement plant in Mexico.

Lawford H. Fry, the technical representative in Europe of the Baldwin Locomotive Works, Philadelphia, Pa., has moved his headquarters from London to Paris, where he has opened an office at 56 Boulevard Haussmann.

Greene, Tweed & Co., New York, have engaged the services of P. R. Simmonds, formerly with the Calculagraph Co., to represent them in the Middle States. Mr. Simmonds' headquarters will be at 226 Lake street, Chicago.

The Sheffield Car & Equipment Co., Kansas City, Mo., has secured 18 acres of land at Kansas City, on which it has begun the erection of two buildings, 70 ft. x 90 ft. each, for repairing and rebuilding freight cars. The plant will be put in operation the latter part of October, employing at first about 300 men.

Wm. E. Peck & Co., 116 Broad street, New York, are interested in the equipment of a terminal for a foreign railroad. The work will include locomotive sheds, turntable, coaling devices and machinery and foundry shops, and the above mentioned firm wants to get in touch with makers of the equipment required.

The Isthmian Canal Commission wants bids at Washington, D. C., until October 5, on ties, rails, angle bars, frogs, repair parts for steam shovels, miscellaneous hardware, tools, stationery, draftsmen's supplies, etc. (Circular No. 465.) The commission also asks for bids up to October 7 on eight electric beam and chamber cranes. (Circular No. 467.)

The Locomotive Appliance Co., Chicago, at the first regular meeting of its board of directors, held on September 8, elected the following officers for the ensuing year: President, C. A. Thompson; First Vice-President, Ira B. Kegler; Second Vice-President, H. S. Gray; Third Vice-President and Treasurer, Willis C. Squire; Secretary and Assistant Treasurer, W. H. England; Mechanical Engineer, E. H. Allfree.

The Pacific Malleable Castings Co., Riverside, Cal., will make malleable iron and malleable steel castings, but at the beginning will confine itself to the smaller classes of work. The company is erecting two buildings 60 x 200 ft. and a pattern shop 30 x 60 ft. The pattern shop will be in operation by January 1. William F. Kerr, who was employed for 12 years by the Chistle Moore Co., Cleveland, Ohio, is Manager.

Frank T. Hyndman, formerly Mechanical Superintendent of the New York, New Haven & Hartford, has been appointed eastern railroad representative of S. F. Bowser & Co., Inc., of Fort Wayne, Ind., manufacturers of oil storage systems. Mr. Hyndman takes the place of William A. Pitcher, who met his death May 3d last, in the Aveline Hotel fire at Fort Wayne. His experience and extensive acquaintance among railroad men will no doubt serve Mr. Hyndman well in his new capacity.

The November quarterly dividend of 1¼ per cent. on the \$25,000,000 common stock of the American Locomotive Company has been passed. The quarterly dividend of 1¼ per cent. on the preferred stock was declared as usual. The directors announced that while they believe that business in general is gradually returning to normal conditions, the locomotive company will not get the benefit of this in time to prevent a decrease in earnings next year and that therefore it is wise to conserve its working capital and surplus.

John Havron has resigned as President of the Rogers Locomotive Works to go with the Latrobe Steel & Coupler Co., with office in the Old Colony building, Chicago. In making this change Mr. Havron returns to serve the interests he left in 1901 to accept the presidency of the Rogers Locomotive Works. His whole business life has been spent with the two companies. Mr. Havron entered the employ of the old Rogers Locomotive & Machine Works at Paterson, N. J., in 1881, leaving there in 1893 to go to Chicago as the Western Representative of the Latrobe Steel Co. In 1901 he was elected President of the Rogers Locomotive Works and has served in that capacity continuously up to the present time. His last change becomes effective October 1. His many years of association with the railroad supply business and the fact that he is returning to a business that he knows well, but which perhaps may not have the same fascination for him as building and selling locomotives, naturally well fits Mr. Havron to assume his new responsibilities.

Frank Rhea, whose resignation of his position on the Pennsylvania Lines West of Pittsburgh was announced in our last issue, has taken a position with the General Electric Company, Schenectady, N. Y., which company now has an important department devoted to railroad signals. Mr. Rhea is one of the best known signal engineers in the country, having been long prominent in committee work in the Railway Signal Association as well as one of the most vigorous debaters among its members. In conjunction with Mr. Rudd, of the Pennsylvania Lines East of Pittsburgh, he made the important and radical report on signaling which was the precursor of the committee report presented to the Railway Signal Association one year ago, recommending a simplified

scheme of signal indications. This report, besides recommending the use of the upwardly inclined semaphore arm—a recommendation which is rapidly finding favor—discussed the whole field of signal practice in great detail, and with refreshing accuracy of statement. Mr. Rhea was born in 1867 and was graduated from the Western University of Pennsylvania in 1892, though he had intermitted his course at the university for the purpose of going into railroad work at the end of his Sophomore year. In 1892 he went to work for the Union Switch & Signal Company at Swissvale; a year later he was appointed foreman of electric signals at Broad Street Station, Philadelphia, and again in another year he resigned and went to the Bell Telephone Company. Two years later, however, he returned to railroad service, beginning as inspector in the signal department of the Pennsylvania Lines West of Pittsburgh; and he remained with that company over 12 years, or until his resignation last month. The last seven years of his service on the Pennsylvania Lines was as Assistant Engineer, first on the Marietta division and then, after two promotions, on the Logansport division.

TRADE PUBLICATIONS.

Engineering.—The Arnold Co., Chicago, is mailing a post card showing three views of the locomotive repair shops of the Grand Trunk at Battle Creek, Mich., the designing and erection of which was done by its company.

Pulverizer.—The Fulton Machine Co., Canal Fulton, Ohio, is distributing a catalogue illustrating and describing its No. 2 Fulton laboratory pulverizer, which is designed to pulverize any hard breakable substance, such as glass, limestone, manganese, iron ore or coke. Three pages are devoted to testimonials from companies who have used this machine.

Canadian West.—A booklet 11 x 8 in., containing 33 illustrated pages describing the Canadian West, has been issued by the Minister of the Interior of Canada. Maps are plentifully supplied and the information given is not only necessary to any one who intends to settle in central or western Canada, but is interesting to any one who cares to read of the work of colonization which is going on in Canada. The government of the provinces is described and instructions are given for taking up government land. The provinces of Manitoba, Saskatchewan, Alberta and British Columbia are described in some detail.

Production of Rails in 1907.

The production of all kinds of rails in 1907, according to the *Annual Statistical Report* of the American Iron and Steel Association, amounted to 3,633,654 tons, against 3,977,887 tons in 1906, a decrease of 344,233 tons, or over 8.6 per cent. The falling off in Pennsylvania amounted to 169,343 tons and in the remainder of the country to 174,890 tons. The maximum production was reached in 1906. The year of next largest production was 1907. Rails rolled from purchased blooms, crop ends and "seconds," and rerolled, or renewed, rails are included. Renewed rails are rails that have been in use and after reheating are rolled down to smaller sections. In the following table the production of all kinds of rails in 1907 is given by states, followed by the annual production since 1897:

States.	Gross tons			Total.
	Bessemer.	Open-hearth.	Iron.	
Pennsylvania	1,093,932	36,837	...	1,130,769
Other states	2,286,093	215,867	925	2,502,885
Total for 1907.....	3,380,025	252,704	925	3,633,654
Total for 1906.....	3,791,459	186,413	15	3,977,887
" " 1905.....	3,192,347	183,264	318	3,375,929
" " 1904.....	2,137,957	145,883	871	2,284,711
" " 1903.....	2,946,756	45,054	667	2,992,477
" " 1902.....	2,935,392	6,029	6,512	2,947,933
" " 1901.....	2,870,816	2,093	1,730	2,874,639
" " 1900.....	2,383,654	1,333	695	2,385,682
" " 1899.....	2,270,585	523	1,592	2,272,700
" " 1898.....	1,976,702	1,226	3,319	1,981,241
" " 1897.....	1,644,520	500	2,872	1,647,892

Twenty-six works in 13 states rolled or rerolled rails in 1907, as follows: New York, 1; Pennsylvania, 6; Maryland, 2; West Virginia, 2; Tennessee, 1; Georgia, 1; Alabama, 2; Ohio, 4;

Indiana, 1; Illinois, 3; Wisconsin, 1; Colorado, 1, and Washington, 1. In 1906 rails were rolled by 22 works in 11 states.

Simplex Velocipede Car.

H. K. Harrison, St. Paul, Minn., is putting out a motor driven-velocipede car for railroad use, called the Simplex. It is built for one man, but can carry two, with such light tools as usually are needed for emergency jobs. The car weighs 210 lbs., is driven by an air-cooled gasoline motor, and carries fuel and lubricant for 150 miles. Mr. Harrison says that the speed can be regulated between 4 and 20 miles an hour, and there is no jerk at the low speeds. Any kind of gasoline can be used for fuel, and common gas engine lubricating oil, used in pumping stations, will do for oiling the car, the oil being fed with a positive pump. The car is regularly furnished with three wheels, but can be equipped with four when it is desired to carry heavy loads most of the time. One gallon of gasoline will run the car from 60 to 80 miles, depending on the load and running conditions.

The Use-Em-Up Drill Socket.

The present method of driving taper shank drills and reamers has been, it is said, the cause of greater losses both in tools and in time. Theoretically, the drill or reamer is driven by the friction in the taper fit of the drill and the socket, the tang being merely to facilitate removing the drill from the socket or spindle. In practice, however, this does not hold true, as the taper of the drills and sockets is not absolutely



The Use-Em-Up Drill Socket.

accurate and therefore the tang must assist in driving the drill, with the result that it is twisted off or the shank is broken. When a flat surface has been ground on the remaining portion of the broken drill shank or reamer the tool may be used with the socket here illustrated and the drive is made positive even if there be only $\frac{1}{2}$ in. or $\frac{3}{4}$ in. of shank left on the drill. Even though the grinding of a flat portion on the drill shank should reduce the diameter of the shank to less than that of the drill itself, it will run true as the original turned portion will center the tool within the socket. A large number of complicated and expensive chucks have been designed to use up broken drills and reamers, but the one here described is probably the simplest and cheapest. The Use-Em-Up drill socket is made by the American Specialty Co., 1440 Monadnock block, Chicago.

Association of American Portland Cement Manufacturers.

The quarterly meeting of the Association of American Portland Cement Manufacturers was held September 14, 15 and 16 at the Hotel Pontchartrain, Detroit, Mich. Beside the regular business, the Michigan Portland Cement Manufacturers' Association arranged a trip down the river to Belle Isle on September 15, where dinner was served. The A. A. P. C. M. dinner was served on Wednesday, the 16th, instead of Tuesday, as usual.

American Locomotives for Bulgaria.

Recent competition among the locomotive and car builders of several countries for the delivery of a number of engines and cars for the Bulgarian State Railways resulted in the American Locomotive Co., New York, underbidding 13 other

concerns. The American Locomotive Company received the contract for four passenger engines at the price of 416,000 francs (\$83,200). In the matter of freight engines, however, the German firm of Orenstein & Koppel took the order for ten, at a total price of 777,600 francs (\$155,520). In bidding for 180 freight cars, the chances seemed to be in favor of German builders, one of whom bid 721,260 francs (\$144,252), and another only 711,385 francs (\$142,277); but these figures are said to be unconfirmed by the Ministry, and there may be another set of bids asked.

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. H. Ardley, Auditor of Disbursements of the Grand Trunk, has been appointed Acting General Auditor, succeeding N. J. Power, granted leave of absence. J. M. Rosevear has been appointed Auditor of Disbursements.

L. S. Berg, President of the Mobile, Jackson & Kansas City, has been elected President of the New Orleans, Mobile & Chicago. This is the new company formed by the merger of the M., J. & K. C. and the Gulf & Chicago. G. W. Cray has been appointed Secretary and Treasurer.

Operating Officers.

W. J. Pace has been appointed Trainmaster of the Canadian Northern at Dauphin, Man.

R. O. Cowling has been appointed Trainmaster of the Oregon Railroad & Navigation Co. at Starbuck, Wash.

W. F. Owen, General Manager of the Mobile, Jackson & Kansas City, has been appointed General Manager of the New Orleans, Mobile & Chicago, which is the new company formed by the merger of the M., J. & K. C. and the Gulf & Chicago.

Traffic Officers.

S. J. Henry has been appointed Assistant General Freight Agent of the Northern Pacific at St. Paul, Minn.

P. H. Byers, Traveling Freight Agent of the Evansville & Terre Haute at Evansville, Ind., has resigned to engage in other business.

J. S. Purdy, Agent of the Texas & Gulf at Longview, Tex., has been appointed also General Freight and Passenger Agent, succeeding E. B. Rembert, assigned to other duties.

H. E. Hershey, Industrial Agent of the Gulf, Colorado & Santa Fe, with office at Galveston, Tex., has resigned to become Secretary of the Waco (Texas) Business Men's Club.

J. L. Edwards has been appointed Commercial Agent of the Southern Railway at Birmingham, Ala. C. H. Pratt, Soliciting Agent at Birmingham, has resigned, and his office has been abolished.

J. R. Dunbar, General Eastern Agent of the New York, Ontario & Western, has been appointed General Freight and Passenger Agent, succeeding Frank Smith, resigned. J. B. Stewart succeeds Mr. Dunbar.

J. R. Guyton, Chief Rate Clerk in the General Passenger department of the St. Louis Southwestern of Texas, has been appointed Chief Rate Clerk of the Gulf, Colorado & Santa Fe at Galveston, Tex., succeeding D. P. Brown.

W. P. Warner, Division Freight and Passenger Agent of the Chicago, Milwaukee & St. Paul at Mason City, Iowa, has been appointed Assistant General Passenger Agent of the lines in South Dakota and Montana, with office at Butte, Mont.

C. B. Foster, District Passenger Agent of the Canadian Pacific at Toronto, has been appointed Assistant General Passenger Agent at Vancouver, B. C., succeeding E. J. Coyle, resigned to engage in private business. R. L. Thompson, General Agent at Cincinnati, Ohio, succeeds Mr. Foster.

C. H. Jackson, Commercial Agent of the Missouri Pacific and the St. Louis, Iron Mountain & Southern at Memphis, Tenn., has been appointed Assistant General Freight Agent, with office at Little Rock, Ark., succeeding E. H. Calef, formerly Division Freight Agent at Little Rock and now promoted to the office of Assistant General Freight Agent at St. Louis, Mo. The office of Division Freight Agent at Little Rock is abolished. R. M. Dozier succeeds Mr. Jackson.

F. S. Holbrook, General Freight Agent of the New York, New Haven & Hartford, has resigned to become Chairman of the Uniform Classification Commission. T. R. Haskins, Freight Traffic Manager of the New England Navigation Co., has had his authority extended over the lines of the N. Y., N. H. & H., and will have his office at New York. L. H. Kentfield has been appointed General Freight Agent, with office at New Haven, Conn. Geo. M. Mead has been appointed Assistant General Freight Agent, with office at Boston, Mass.

Engineering and Rolling Stock Officers.

S. C. Grant has been appointed Signal Supervisor of the Nebraska division of the Union Pacific, succeeding E. W. Kolb, resigned.

A. H. Gairns has been appointed Master Mechanic of the Oregon Short Line at Pocatello, Idaho, succeeding Henry Carrick, assigned to other duties.

David Patterson has been appointed Master Mechanic of the Kansas & Oklahoma division of the Kansas City, Mexico & Orient, and J. S. Hardie has been appointed General Foreman of the car department, both with headquarters at Fairview, Okla.

S. E. Hanna, Division Engineer of the Memphis division of the St. Louis, Iron Mountain & Southern, has been appointed Division Engineer of the Missouri division, with office at DeSoto, Mo., succeeding E. C. Welch, transferred. R. C. White succeeds Mr. Hanna, with office at Wynne, Ark.

E. A. McFarland, Chief Engineer of the Sonora Railway, the Cananea, Yaqui River & Pacific, the Arizona Eastern, the Gila Valley, Globe & Northern, the Arizona & Colorado, the Maricopa & Phoenix and the Phoenix & Eastern, has resigned, and R. L. Drane, Assistant Chief Engineer, will for the present report to Epes Randolph, President.

W. C. Smith, Engineer in charge of Maintenance of Way of the Northern Pacific, with headquarters at St. Paul, Minn., will hereafter have jurisdiction of the lines east of Trout Creek, Mont. A. R. Cook, Division Engineer at Tacoma, Wash., has been appointed Engineer in charge of Maintenance of Way of the lines west of Trout Creek, with headquarters at Tacoma, Wash. B. L. Crosby succeeds Mr. Cook.

Frank Howard has resigned as General Foreman in the car department on the Eastern division of the Wabash. Mr. Howard began railroad work in 1869 as car builder for the Missouri, Kansas & Texas; he later became General Foreman of the same road and from 1879 to 1881 was Master Car Builder of the Denver & Rio Grande. From 1881 to 1884 he was Master Car Builder of the Northern Pacific, and from 1884 to 1885 was Master Car Builder of the Texas & Pacific. Since 1885 he has been at the head of the car department of the Wabash.

Storekeeper.

A. J. Barragar has been appointed Storekeeper of the Texas Midland, succeeding Dan Quill, resigned.

OBITUARY.

David D. Stubbs, General Manager of the Occidental & Oriental Steamship Co., died in San Francisco, Sept. 7. Mr. Stubbs had been prominent in traffic affairs in California for a number of years.

Charles K. Lord, President of the Tonopah & Tidewater, died in Philadelphia on September 10. He was 60 years old. He began railroad work in 1865 as clerk in the general ticket office of the Indianapolis, Cincinnati & Lafayette, now part

of the Cleveland, Cincinnati, Chicago & St. Louis. By 1873 he had become Assistant General Passenger Agent, and the next year was made General Passenger Agent of the St. Louis, Kansas City & Northern, now part of the Wabash. In May, 1880, he was made General Passenger Agent of the Baltimore & Ohio, and in 1888 was elected Third Vice-President. In 1896 he was elected President of the Consolidated Coal Co. In 1903 he became President of the Tonopah at Goldfield.

Railroad Construction.

New Incorporations, Surveys, Etc.

ARKANSAS CENTRAL.—J. H. Wright, President, is quoted as having said that material for building the 6-mile extension from Paris, Ark., has been received and that work will begin at once.

BEAVER VALLEY & NORTHWESTERN.—The preliminary survey from Beaver, Okla., west to Hooker, in Texas county, has been completed, making a grade of 1 per cent. The proposed road follows the Beaver river valley almost the entire distance. At Hooker the road will connect with the El Paso line of the Rock Island. The company was incorporated with a capital of \$4,000,000 to build a line from Gage, in Ellis county, through Beaver and Hooker to Guymon. (July 24, p. 599.)

BUFFALO, LOCKPORT & ROCHESTER (ELECTRIC).—Announcement is made that this company, building an electric line from Rochester, N. Y., west to Lockport, 54 miles, is to be opened soon for service from Rochester to Middleport, 40 miles. It is expected to have the entire line in operation by Nov. 1. From Lockport the company expects to use the tracks of the International Railway into Buffalo. J. G. White & Co., New York, are the contractors. (R. R. G., March 13, p. 390.)

CANADIAN NORTHERN.—An officer is reported as having said that the line will reach Calgary, Alb., in the near future.

CANADIAN PACIFIC.—The report of this company for the year ended June 30, 1908, gives the total length of all lines as 10,369 miles, including 708 miles under construction. The work now under way is divided as follows:

EASTERN DIVISION.

Northern Colonization Railway.—Nominique, Que., to Rapide de l'Original, 35 miles.

ONTARIO DIVISION.

Tilsonburg, Lake Erie & Pacific.—Embro Station, Ont., to Embro Village, 6 miles.

Guelph & Goderich Listowel Branch.—16.1 miles.

Georgian Bay & Sea Board.—Victoria Harbour, Ont., to Cold Water, 13.3 miles.

CENTRAL DIVISION.

Stonewall Branch.—Komarno, Man., north to Iceland River, 30 miles.

Pheasant Hills Branch.—Nokomis, Sask., to Hardisty, 328.5 miles.

Virden Branch.—Virden, Man., to McAuley, 10 miles.

Souris Branch and extension.—Weyburn Branch. Stoughton, Sask., to Weyburn, 36.7 miles.

Manitoba & Northwestern.—Yorktown extension. Sheho, Sask., to Lanigan, 82.8 miles.

WESTERN DIVISION.

Moose Jaw Branch.—Moose Jaw, Sask., northwest 107 miles.

Bulyea Branch.—Regina, Sask., to Bulyea, 43 miles.

CANADIAN RIVER RAILROAD.—See Santa Fe, Liberal & Englewood.

CHICAGO, MILWAUKEE & ST. PAUL.—The report of this company for the year ended June 30, 1908, shows that the line from Chamberlain, S. Dak., on the Missouri river, west to Rapid City, 219 miles, was finished during the year. Also a line from a point near Glenham, S. Dak., to Mobridge, 12 miles. Both lines are now in operation. At Mobridge connection is made with the Pacific coast line building to Seattle, Wash., Tacoma and other Puget Sound points, on which satisfactory progress is being made, track laying having been finished from the Missouri river west to Butte, Mont., which has been put in operation since the report was issued. On the remaining 650 miles, track laying has been finished on

about 250 miles in the states of Montana, Idaho and Washington.

An unofficial report says that in the state of Washington a large force of men are at work and track is being laid at the rate of two and a half miles a day. Between Murdock and Clealum to the west track has been laid nearly to Clealum and is also being laid east to Murdock, where about 14 miles are finished. In Kittitas county work has been somewhat delayed because the bridge and trestle construction has not been finished. When the tunnel through Jackson Creek Summit, which is to be about 2,000 ft. long, is finished about January, 1909, 20 miles of track will be laid to the Columbia river. Between Ellensburg and Columbia river there will be about 18 trestles and small bridges, most of which are to be over canyons. Frame work trestles will be used. At The Narrows there is to be a wooden trestle 120 ft. high, to be replaced later by a steel bridge. Piling and false work is nearly finished for five crossings over the Yakima river, and the company has the steel work for these bridges in its yards at Murdock.

COLORADO RAILWAY.—An officer writes regarding the recent reports of a charter to build a number of lines in Colorado that merely an amendment to the original charter has been obtained and that there is no intention of doing any work under it this year.

DALLAS & NEW MEXICO.—The property of this projected line, which includes the right of way and grade formerly owned by the Dallas, Pacific & South Eastern from Dallas, Tex., to a point about 70 miles northwest through Dallas, Tarrant, Denton, Wise and Jack counties, was recently sold at a receiver's sale to Roy V. McGargle, of Philadelphia, Pa. Reports from Houston say that the line is graded ready for ties from Dallas to a point in Jack county, through the towns of Grapevine, Roanoke, Justin, Rhome, Aurora and Boyd. W. M. Townsend, attorney for McGargle, says that construction work is to be resumed soon.

DES MOINES, COUNCIL BLUFFS & WESTERN.—Incorporated in South Dakota, with \$100,000 capital, to build a line from Council Bluffs, Iowa, to Des Moines, with an eastern extension to Muscatine, Iowa. The directors are: Robert Pilmery, Norwalk, Iowa; N. W. Hansen, Haslith, Iowa; R. C. Wallace, J. S. Carlock and R. S. Bannister, of Des Moines, and A. P. Sawyer, of Pierre, S. Dak. The offices of the company are at Des Moines.

ENID, OCHILTREE & WESTERN.—Under this name a company is being organized to build a line from Enid, Okla., west via Ochiltree, Tex., to Dalhart, about 265 miles. It is proposed to secure subscription along the line for \$500,000 in stock, of which over \$300,000 has been secured, besides rights of way and terminal sites. The present plans provide for building the first 100 miles from Dalhart, east to Ochiltree. On this section the grade will not exceed one-half of 1 per cent., and there will not be any bridges and only a few culverts. A. E. Wiest, Jr., Vice-President and General Manager, Ochiltree, will have charge of construction.

GALESBURG, ALEDO & NORTH WESTERN.—Incorporated with \$10,000 capital stock to build a railroad from Galesburg, Ill., in a west and north direction, through the counties of Knox, Warren and Mercer to Aledo, and from there through Rock Island county to the cities of Rock Island, Ill., and Muscatine, Iowa. The incorporators and first board of directors are: Lafayette Weinberg, G. B. Churchill, F. W. Latimer, B. F. Arnold, E. R. Drake, Charles L. Hibbard, C. F. Hurburgh, Lake W. Sanborn and Thomas W. Peterson. The offices of the company will be at Galesburg.

GRAND TRUNK PACIFIC.—Announcement has been made that this road will build a cut-off in Northern British Columbia from Fort George to Fort Fraser.

Collingwood Schrieber, Consulting Engineer for the Dominion Government, says that this company will soon ask for bids for building 100 miles more of the line east from Prince Rupert, B. C., and also 100 miles westward from Yellowhead Pass. After these contracts have been placed, there will be left about 400 miles of the entire line to be put under contract. (Sept. 11, p. 933.)

GREAT NORTHERN.—It is stated that preliminary work for beginning the construction of the Moses Coulee branch of the Great Northern, in the state of Washington, is now being done. A number of the sub-contractors are getting their equipment on the proposed line and a large warehouse will soon be erected at the mouth of the Coulee river.

IDAHO RAILROAD & NAVIGATION (ELECTRIC).—This company, recently incorporated with \$100,000 capital, is making surveys along Tucannon river from a point near Grangeville, Wash. The line is an alternative to the route recently covered by a survey up Deadman creek, which joins the Snake river at a point northwest of Pomeroy, Wash. G. Van Arsdale, President; S. M. Tate, Secretary; C. W. Hadley, General Manager. The office of the company is in the Hyde block, Spokane, Wash. (September 4, p. 889.)

LOUISVILLE & EASTERN (ELECTRIC).—As soon as the pending negotiations for the sale of a controlling interest and a reorganization is effected, it is said that work on the extension from Shelbyville east to Frankfort, Ky., 22 miles, is to be started. The cost of this work will be about \$400,000.

MERIDIAN & SOUTHWESTERN.—Preliminary surveys reported made for a line from Meridian, Miss., southwest towards Natchez, about 100 miles. Organization has not yet been completed. The promoters include W. H. Hughes and W. A. Wall, of Raleigh, Miss.; W. Cornell, of Lake; A. H. Longino, of Jackson; B. J. Hamrick, of Hickory; B. King, of Mendenhall, and S. L. Ryan, of Rose Hill.

MIDLAND VALLEY RAILROAD.—Kahnmann & McMurray have secured the contract for the cut-off near Fort Smith, Ark.

MINERAL BELT.—The Guanajuato Mining & Milling Co., under the name of the Mineral Belt, is building a narrow gage line to handle ore from its numerous properties. The plans call for a line to connect Pinguico, Pregrina, San Mateo, Santa Rosa, La Luz and Nueva Luz with the mining camp of Guanajuato in the state of the same name. A large force is now at work. The line is finished and in operation from Pinguico to a point about two miles from the company's mill. H. S. Leach is in charge of the construction.

NEW JERSEY RAPID TRANSIT.—Incorporated in New Jersey with an authorized capital of \$1,000,000 to build a railroad from Paterson, N. J., to Suffern, N. Y., about 14 miles. The incorporators are T. J. Maloney, Jersey City; H. M. Parmalee, H. Bogart, C. D. Cook, G. H. Pierce, all of Paterson, N. J.; M. S. McAdoo, Montclair, N. J., and G. M. Dunlap, Spring Valley, N. Y.

NEW ORLEANS PUBLIC BELT.—This company will build additional track facilities to various industries in New Orleans, La. Material for this construction will be purchased at once. A. S. Phelps, Superintendent, New Orleans. (June 19, p. 209.)

NEZPERCE & IDAHO (ELECTRIC).—Only three miles of roadbed remain to be graded on the 40-mile electric line building from Nezperce, Idaho, northeast to a connection with the Grainville branch of the Northern Pacific. Track laying is to be begun about October 15. It is expected that the entire line will be finished before December. (Sept. 4, p. 889.)

NORFOLK & WESTERN.—The report of this company for the year ended June 30, 1908, shows that work is under way on extensions and branch lines as follows:

Tug Fork Branches.—An extension of Sand Lick branch up the Right Fork of Sand Lick, 2.13 miles, has been graded and 1.97 miles of track laid, to the United States Coal & Coke Company, which is now in operation. The roadbed of the extension of the Tug Fork branch, 4.03 miles above Pageton, W. Va., is 75 per cent. finished.

Freburn Branch.—This branch has been finished to a point in Kentucky, opposite Delorme, W. Va., 1.55 miles.

Honaker Branch.—An extension has been finished to Blackford, Va., making the total length of this branch 5.49 miles.

Big Stony Railway and Extensions.—The Big Stony Railway has been extended 4.82 miles to Kire, Va., which is 15.33 miles from the junction with the main line of the Norfolk & Western near Ripplemead, Va. The roadbed from Kier to the state line, 1.42 miles, is about 70 per cent. finished. At Big Stony Junction, the bridge has been rebuilt over New river, and the light structure replaced by a standard steel bridge

560 ft. long. The trestle approaches to this bridge have been replaced by embankments, and the line and grade of the Big Stony Railway for 1.06 miles below the bridge has been improved.

The Interior & West Virginia is under construction through Monroe county, W. Va., from the terminus of the Big Sandy extension at the Virginia state line, to a connection with the Virginia & Potts Creek railroad, 17.55 miles. The roadbed is about 65 per cent. finished.

The Virginia & Potts Creek is under construction for 4.2 miles from the projected terminus of the Interior & West Virginia at the state line to iron ore developments near Paint Bank, Va. The roadbed is finished on about 60 per cent.

Pocahontas & Western.—This company has in operation 3.29 miles of main line and 1.13 miles of sidings in Virginia. Work on an extension to the Thorne Operation of the Pocahontas Consolidated Collieries Company, Inc., 3.81 miles above Boissevain, Va., was temporarily stopped in November, 1907, at which time the roadbed was about 70 per cent. finished.

Guyandot & Tug River.—Further progress has been made in securing right of way for the main line between Clarke's Gap, W. Va., and Wharnccliffe, 62.27 miles, and for the Barker Creek branch, 10.7 miles. The location of the extension of the Barker Creek branch has been finished for a total of 11.49 miles, to a point on Devils Fork of Guyandot river. Progress has also been made in securing rights of way for the Pinnacle Creek branch, which is about 7.35 miles long; the Cabin Creek branch and Still Run branch, the latter to be 3.56 miles.

The improvements made during the year at various places on the system include extensive additions to division yards at Roanoke, Va.; Winston-Salem, N. C.; Bluefield, W. Va., and Williamson, W. Va., and these additions are now in operation. A number of passenger stations and freight houses, also some new shop buildings were built or enlarged. The main track on 44.49 miles was relaid with 85-lb. rails, and 39.37 miles in the Winston-Salem district were laid with re-sawed 85-lb. rails.

OKLAHOMA ROADS.—According to reports from Oklahoma City, W. W. Bonson, of Des Moines, Iowa, has projected a line from Oklahoma City, Okla., northwest towards Raton, N. Mex. The Chamber of Commerce of Oklahoma City is said to be interested in the project.

OREGON & WASHINGTON.—See Oregon Railroad & Navigation.

OREGON RAILROAD & NAVIGATION.—A contract has been given to Twohy Brothers, Spokane, Wash., for the construction of the first section of the Oregon & Washington from Seattle, including a line from the tide flats in Seattle to Black River Junction, eight miles. Work began on September 5.

PITTSBURGH, BINGHAMTON & EASTERN.—This company was recently placed in the hands of a Receiver, who is to work out the necessary financial plans and is to carry out the completion of the line projected from Binghamton, N. Y., to Clearfield, Pa., 225 miles. About 25 miles of the line is nearing completion. (R. R. G., Feb. 28, p. 298.)

ST. LOUIS, OKLAHOMA & SOUTHERN.—This company, promoting a road from Joplin, Mo., to Muskogee, Okla., is now seeking a direct route to the Gulf of Mexico. Surveys have been made from Mineola, Tex., to Quitman, and the promoters are said to have made the statement that the road would be built.

SALINE COUNTY TRACTION.—Incorporated with a capital stock of \$5,000 to build an electric line from a point on the southern boundary line of Saline county, Ill., north to a point on the northern boundary line of the same county, via Carriers Mills, Harrisburg and Eldorado, 30 miles. The incorporators are: L. E. Fischer, General Manager of the Illinois Traction System, Danville, Ill.; A. C. Murray and J. A. Swanberg, Springfield; W. L. Murphy and L. W. Johnson, Danville.

SAN ANTONIO, CHAPIN & RIO GRANDE VALLEY.—Press reports from Brownsville, Tex., say that this company has given a contract to Sam Robertson to build 25 miles of the road.

SANTA FE, LIBERAL & ENGLEWOOD.—Building a line from Des Moines, N. Mex., east via Hooker to Woodward, Okla., with a branch from Gate, Okla., northeast to Englewood, Kan., a total of 321 miles. From the proposed terminus at Woodward an eastern line is to be built under the amended charter of the Canadian River Railroad, which has its headquarters at

Woodward. The line is to run south from Woodward, Okla., through Woodward, Dewey and Blaine counties, to Watonga, with branches from there to both Guthrie and Oklahoma City, a total of 220 miles. The incorporators include H. B. Peebles and A. H. Applegate, of Woodward; C. A. Barden, of Boston, Mass.; H. C. Morand, of New York, and F. L. Hamilton, of Ralston, N. Mex. (R. R. G., April 3, p. 493.)

SHEARHOUSE LUMBER Co.—The proposed passenger and freight line to run from Brooklet, Ga., southwest to Groveland, about 25 miles, is to be built at once.

SOUTHERN PACIFIC.—According to press reports, officials of this company say that the Utah Construction Co. will build a new 32-mile line from Rocklin, Cal., north to Colfax, on the west side of the Sierras. Surveys are almost finished for the new line, which is to have a 1½ per cent. grade as compared with the existing route, which has 2.2 per cent. The new line is to be used for eastbound traffic and will require a year to build. Westbound traffic will be continued over the old route.

The Texas & New Orleans has given a contract to Suderman, Dolson & Co., of Galveston, Tex., for building an extension from Gallatin, Tex., south to Rusk, 8 miles. The contract calls for the completion of the line by February 28, 1909. (September 11, p. 934.)

SOUTHERN UTAH.—This company filed plans last week in the United States land office at Salt Lake City, Utah, for an approved right of way for a line from Price, Utah, southwest along Miller creek into the coal fields of Carbon county, about 20 miles. Construction will begin this fall. A. A. Sweet, General Manager, Price, Utah. (June 12, p. 96.)

SPokane & Inland Empire (Electric).—The Spokane, Columbia & Western, incorporated in the state of Washington to build an electric or steam line from Spokane, Wash., west via Mondovi to Davenport, thence northwest via Peach to Miles City, 60 miles. This company is affiliated with the Spokane & Inland Empire, and will be known as the Big Bend extension of that road. The road will be operated initially by steam locomotives.

SPokane, Columbia & Western (Electric).—See Spokane & Inland Empire.

TEXAS & NEW ORLEANS.—See Southern Pacific.

TEXAS ROADS.—According to reports from Marshall, Tex., a line is now being built through the eastern section of the state in Rusk county, north, towards Marshall. Mayor Heyn, of Marshall, may be addressed.

THE STERLING TRUST Co.—The Sterling Trust Co., Kansas City, Mo., is being organized for the purpose of financing a system of interurban railroads, radiating from Kansas City. The first line proposed will be from Lawrence, Kans., to Topeka. It is said that the company will be capitalized at \$10,000,000. William Kenefick, a railroad contractor of Kansas City, Mo., is interested in the company.

THUNDER CREEK TRANSPORTATION & SMELTING Co. (Electric).—An officer writes that this company, recently incorporated in the state of Washington, proposes to build an electric line about 22 miles long. Plans, it is expected, will be finished by January, 1909. A. M. Richards, President, and H. J. Fuller, Chief Engineer, both of Tacoma, Wash. (Aug. 28, p. 839.)

YORK RAILWAYS.—Bids are wanted until Sept. 30, by L. C. Mayer, Chief Engineer of this company at York, Pa., for grading 4½ miles of line, involving the handling of 80,000 cu. yds. of earth.

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ATLANTA, BIRMINGHAM & ATLANTIC.—Regular trains are being run into Birmingham, Ala., between Pelham and Birmingham by the Atlanta, Birmingham & Atlantic over the Louisville & Nashville, pending the completion of the company's own line.

ATLANTIC & LAKE SUPERIOR.—By the order of the Exchequer Court of Canada, the property of this company and of the Baie des Chaleurs, which it controls, were sold, on Septem-

ber 10, to the Royal Trust Co., of Montreal, Que., for \$350,000 and \$1,050,000, respectively. The combined roads form a line running from Metapedia Station, Que., on the Intercolonial, to Paspebiac, 100 miles.

BOSTON & MAINE.—This company has sold to a syndicate including Kidder, Peabody & Co., Boston, Mass., \$7,300,000 six months' 3½ per cent. notes. The new notes are being offered at par, and are to provide for the retirement of about \$8,000,000 notes falling due within the next few months.

The \$379,100 capital stock of the Boston, Revere Beach & Lynn, which has been held by the Boston & Maine as collateral for a loan, has been sold to Estabrook & Co., Boston, Mass., at \$110 a share. The total amount issued of this stock is \$350,000.

CANADIAN PACIFIC.—See New Brunswick Railway.

CENTRAL OF GEORGIA.—The interest on the first income bonds not being paid, bondholders met September 15 at the office of Prince & Whitely, New York, and appointed a protective committee, consisting of R. Walter Levy, of Maitland, Coppel & Co.; Frederick William Scott, of Scott & Stringfellow, of Richmond, Va., and Walter P. Gardner.

CHICAGO, BURLINGTON & QUINCY.—The stockholders are asked to vote on November 15 on the question of purchasing the following roads:

	Miles.
Fulton County Narrow Gage, Galesburg, Ill., to West Savannah	57
Northern & Southern Illinois, Centralia, Ill., to Herrin	53
Sioux City & Western, Ashland Junction, Neb., to Sioux City and Western Junction	103
Big Horn Railroad, Frannie Junction, Wyo., to Worland	91
Total	304

DENVER & RIO GRANDE.—Stockholders authorized, on September 10, an issue of \$150,000,000 bonds. Enough bonds are to be issued at once to secure \$15,000,000 notes guaranteed by the Denver & Rio Grande on behalf of the unfinished Western Pacific, and of which notes \$10,000,000 have been sold.

GULF & CHICAGO.—See New Orleans, Mobile & Chicago.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—Spearling & Co., London, England, are offering \$700,000 7 per cent. preferred stock of the Minneapolis, St. Paul & Sault Ste. Marie at 145.

MUNICIPAL TRACTION.—This company, which operates the electric street railways of Cleveland, Ohio, is again charging 3 cents for a single cash fare, providing the passenger be supplied with even change. The company has been charging 5 cents for a cash fare, but selling five tickets for 15 cents.

MOBILE, JACKSON & KANSAS CITY.—See New Orleans, Mobile & Chicago.

NEW BRUNSWICK RAILWAY.—A reduced dividend has been declared on the \$3,000,000 stock. The rate has not been made public. The road is operated under lease by the Canadian Pacific.

NEW ORLEANS, MOBILE & CHICAGO.—The stockholders of this company, which was organized last June to build from Ovette, Miss., on the line of the Mobile, Jackson & Kansas city to Nicholson, and of the M. J. & K. C. and the Gulf & Chicago have voted to authorize the consolidation of these three companies under the name of New Orleans, Mobile & Chicago. The Mississippi Railroad Commission has given its consent to this consolidation.

NEW YORK CITY RAILWAY.—The suit brought last year to dissolve the company on the ground that it had been insolvent for at least one year, has been dismissed and the receivership granted by the state court has been vacated. This in no way affects the authority of W. W. Ladd, who is the receiver appointed by the Federal court.

SOUTHERN INDIANA.—The protective committee, A. G. Hodenpyle, Chairman, has added E. K. Boiset to its membership.

VIRGINIA PASSENGER & POWER Co.—The reorganization plan has been declared operative, more than 55 per cent. of the securities provided for in the plan having been deposited. (August 14, p. 742.)